

Kew Bulletin

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REVIEW OF THE WORK OF THE ROYAL BOTANIC GARDENS, KEW, DURING 1950

General

The Director was appointed an Hon. President of the Seventh International Botanical Congress, but unfortunately was prevented from attending. He has been reappointed a Vice-President of the Royal Society and the Permanent Secretary of the Ministry has re-nominated him as Vice-Chairman of the Agricultural Improvement Council. He has also been appointed a member of the Joint Committee of that body and the Agricultural Research Council.

The University of Edinburgh, on July 6th, conferred upon the Director the Degree of LL.D. *honoris causa*. He was invited to deliver the Amos Memorial Lecture at Wye on the 26th October, and took as his subject "The Fruit Tree and its Environment".

The Director represented the Royal Society at the 500th Anniversary Celebrations of the University of St. Andrews.

As Fullerian Professor of the Royal Institution, the Director on 28th April delivered a Friday Evening Discourse on the Royal Botanic Gardens, Kew, and in March a course of lectures on "The ecology of the Dune habitat". The usual term of office as Fullerian Professor is three years, but the Royal Institution has re-elected the Director for a further term.

His period of office having terminated, the Director retired as a member of the Scientific Advisory Committee to the Lord President in February.

Dr. W. B. Turrill was President of Section K. Botany, British Association for the Advancement of Science. He is also President of the British Ecological Society.

The Herbarium

The amount of routine work carried out in the Herbarium during the year is indicated in part by the following figures :—

Specimens received for the Herbarium, 53,376 ; specimens received on loan, 7,129 ; specimens sent on loan, 7,364 ; specimens distributed as duplicates, 4,275 ; sheets mounted, 37,898.

Laying-in has approximately kept up with the number of sheets mounted.

Visits paid to the Herbarium and Library by botanists numbered 4,317. This figure does not include the 472 visitors on the 5th and 6th May when special exhibits of the work of the whole Institution were on view. An exceptionally large number of overseas botanists studied at Kew for longer or shorter periods on their way to or from the International Botanical Congress at Stockholm.

The scientific staff continue to be indebted to Mr. W. C. Worsdell for assistance in the translation of papers from various foreign languages. Miss M. M. Whiting has continued to give valuable voluntary service in re-arranging material from India and Malaysia. Miss S. Wilson has helped with the laying-in of drawings. Dr. J. Hutchinson has worked in the Herbarium and Library, particularly on the genera of flowering plants.

During the year a total of 2,361 enquiries and plant consignments has been dealt with. This is more than last year. It is a pleasure to report that the higher standard of collecting has been generally maintained. It is now the rule to impress upon collectors the need for good quality rather than quantity of specimens.

International Botanical Congress

Dr. W. B. Turrill, Miss E. M. Wakefield, Mr. C. E. Hubbard and Mr. H. K. A. Shaw attended officially the Seventh International Botanical Congress held at Stockholm in July 1950. Dr. Turrill gave a lecture as an evening discourse on "Curtis's Botanical Magazine". Mr. Hubbard read a paper introductory to a symposium on "The System of Gramineae". Miss Wakefield and Mr. Shaw were the Kew representatives to the nomenclature section and took part in the long discussions that, it is understood, have led to the modifications of some of the International Rules of Botanical Nomenclature. Miss C. I. Dickinson was granted special leave to attend the Congress.

British Association for the Advancement of Science

Dr. W. B. Turrill was President of Section K (Botany) for the Birmingham Meeting at which his address dealt with "Modern trends in the classification of plants."

Europe, Orient and North Africa. Mr. Blakelock's account of E. R. Guest's collections from Iraq has again been given priority and the final parts have now been sent to press. This work has entailed considerable sacrifice in other directions over a period of years, and with its completion more rapid progress is expected in other research, notably the account of Mrs. H. R. P. Dickson's collections from Kuwait, N. Arabia, of which a second instalment is almost ready for printing. A study of *Lamium amplexicaule* and its allies in the Middle East is being made in connection with cytogenetic work being carried out by Dr. P. Bernström of Lund, Sweden, and there have been calls for research in several other genera in the same area including *Heliotropium*, *Medicago*, and *Origanum*.

Acquisitions which have been, or are in course of being named by the department include further specimens from Mrs. Dickson (N. Arabia), Mr. A. C. Trott (Tropical Arabia) and a most useful collection of some 400 numbers from Bahrein Island, Persian Gulf, presented by Prof. R.

Good. From Cyprus there have been plants of especial interest from Mrs. E. W. Kennedy, Mrs. Grove, and Mr. E. C. Casey, a small collection from Mr. J. F. Barrington and about 700 specimens collected by Mrs. E. C. Chapman while plant-ecologist to the Moroccan Locust Research Scheme. Small European collections have come in from the Pyrenees (Mr. C. Sandeman), Greece (Mr. C. N. Goulimy), Bulgaria (Miss R. de Sausmarez) and Finland (Mr. G. E. Wickens).

Named collections received included some from Spain (Jardim Botanico, Madrid), Portugal (Jardim Colonial, Lisbon and University of Coimbra), Holland (Rijksherbarium, Leiden), Scandinavia (Botaniska Riksmuseet, Stockholm), Denmark (Mr. W. R. Price), and Iceland (Dr. Löve). British specimens have been received from Prof. J. W. Heslop-Harrison, the Public Museum, Carlisle, and many members of the Kew staff. Mr. H. P. Davis has continued to send his Turkish specimens, and a small collection from the same area has been received from Dr. Huber-Moratt, the beginning of an exchange arrangement.

China and Japan. Work in the Herbarium has mainly been concerned with curatorial matters, while a considerable amount of time has had to be given to enquiries concerning cultivated plants.

A large number of duplicates from the Paris Herbarium has been checked with the existing collections, and collections not already represented have been incorporated.

During the year a very large consignment of specimens was received from the Hongkong Herbarium. The scope of that Herbarium has now been restricted to material from Hongkong and the adjacent parts of China, and the remainder of the material originally in the Herbarium, some 15,000 sheets, has been presented to Kew for distribution. The material includes collections not previously represented at Kew, and these will be extracted and incorporated as opportunity allows.

Research on *Camellia* has been continued, and a lecture on the genus was given at the R.H.S. Camellia-Magnolia Conference. A small amount of work has been undertaken on other groups, e.g. *Iris* and *Tulipa*.

Two Chinese botanists, Mr. P. C. Tsoong and Mr. T. T. Yü, continued to work at Kew until they left for home in August, Mr. Tsoong being mainly concerned with the *Scrophulariaceae* of eastern Asia and Mr. Yü with the *Pomaceae* of that region.

Malaysia. The work that had begun on the revision of *Gonystylus* and *Pentaphragma* for the *Flora Malesiana* (see last year's report) was interrupted in March by illness, followed by the students' exhibition in May, the International Botanical Congress at Stockholm in July, annual leave in August, and the training of new staff from September onwards. A paper on some new species of *Gonystylus*, etc., was published. It is hoped that this work may shortly be resumed.

The late Dr. A. F. G. Kerr's collection of *Araceae* from Siam, which had been critically studied by F. Gagnepain for the *Flore Générale de l'Indo-Chine*, has been mounted and incorporated in the Herbarium.

The mounting and incorporation of the large unnamed *Clemens* (1929-31) collections from Borneo was continued and completed during the

year, over 3,000 specimens being dealt with. A start was made on mounting the large named collection from the Malay Peninsula received from the Singapore Botanic Garden in 1947. The Malay Peninsula material of *Eugenia* was re-arranged by Henderson's revision (Gardens' Bulletin, Singapore, 12 : 1-293, 1949).

No further work has been possible on the outstanding material of the Oxford University Expedition to Sarawak, 1932, but attention should be drawn to the account of the liverworts of the collection, subtitled 'Hepaticae Borneenses', by Th. Herzog, published in *Trans. Brit. Bryol. Soc.* 1 (4) : 275-326 (1950).

With the appointment in August of Mr. F. N. Hepper, B.Sc., as Scientific Officer, it was possible to carry out further routine naming of the large and valuable collections of material received from the Forest Department, North Borneo, and two extensive lists of determinations were prepared and sent out. This work was unfortunately terminated by Mr. Hepper's departure for military service on December 4th.

Tropical Africa. Our war-time accumulation of specimens has, during the year, been reduced to quite a small amount, and this valuable material is now largely named and available for consultation in the Herbarium. The high standard of incoming collections has been maintained, and in this particular the following collectors may be mentioned :—F. C. Deighton, P. Adames, H. D. Jordan, H. C. King (Sierra Leone), J. T. Baldwin, jr. (Liberia and elsewhere), K. Obeng Darko (Gold Coast), R. W. J. Keay (Nigeria), W. J. Eggeling, J. W. Purseglove and H. C. Dawkins (Uganda), P. R. O. Bally, R. W. Rayner, G. M. Tweedie (Kenya), H. G. Faulkner, P. J. Greenway and B. Verdcourt (Tanganyika), P. O. Dicke (Nyasa-land), H. J. A. Rae (Northern Rhodesia), H. Wild (Southern Rhodesia), H. G. Faulkner (Portuguese East Africa). Smaller but no less useful collections have been received from a number of other collectors, but space will not allow mention of their names. Among them are several who have kindly undertaken to collect in East Africa in connection with work on the Flora (see below).

A most useful and excellent collection from southern Africa, collected on the University of California African Expedition, has been received from Mr. R. J. Rodin, whilst valuable duplicates have been received in exchange from the Jardin Botanique, Brussels, the Centro de Botanica da Junta de Investigações Coloniais, Lisbon, and the National Herbarium, Pretoria.

The Keeper of the Herbarium and Library and Mr. Milne-Redhead, whom the Director has appointed Editors of the "Flora of Tropical East Africa", have prepared the text of one family, *Ranunculaceae*, so as to provide a specimen for contributors, and this text has now gone to press.

Mr. J. H. Hemsley and Mr. J. Lewis were appointed by the Colonial Office to assist with the work on the East African flora, and took up their duties in August. Mr. R. D. Meikle returned from Nigeria at the end of March, having made a valuable collection whilst attached to the expedition organised by the Medical Research Council (see publications, p. 23). Mr. A. A. Bullock was given permission to remain in Africa another year.

Researches on various groups of African plants continue. Dr. C. G. B. Bremekamp, working at Utrecht, has finished his revision of *Oldenlandia* and allied genera and has kindly determined several hundreds of Kew specimens which are now back at Kew. His account of the group is eagerly awaited. Thanks are also due to Prof. Suessenguth for determining Africa *Amaranthaceae*, to Mr. A. C. Hoyle for naming *Brachystegia*, as well as to botanists at the British Museum and at Brussels for much assistance with determinations. The genus *Clematopsis* (*Ranunculaceae*) has been revised in collaboration with Mr. A. W. Exell and D. J. Léonard.

Progress continues with the preparation of an enumeration of L. J. Brass's plants collected on the Vernay Nyasaland Expedition, 1946, and it is hoped to complete this important work during 1951.

Mr. J. G. Andoh, of the Gold Coast Forestry Department, finished his attachment to Kew in June and returned to his Department. Mr. G. K. Akpalla of Achimota College, Gold Coast, was studying in the Kew Herbarium during the Long Vacation. Dr. D. G. Cufodontis began a three months' visit to Kew in early December, when he continued his taxonomic researches on the African species of *Pittosporum*. Other visitors working on African plants include Dr. F. W. Andrews, Prof. P. DuVigneaud, Dr. J. G. Garcia, Dr. H. B. Gilliland, Prof. Emilio Guinea, Dr. F. A. Mendonça, and Dr. A. R. de Torre.

In September, a meeting of British and Foreign botanists was held, at which the "Association pour l'Étude taxonomique de la Flore d'Afrique tropicale" (A.E.T.F.A.T.) was formed. Its object is to facilitate co-operation between individual botanists working on tropical African plants. At a subsequent meeting, Mr. R. D. Meikle was appointed Hon. Secretary. Any botanists interested in the Association should apply to him, at the Kew Herbarium, for information.

America. Work has been continued on the valuable consignments sent by the Forest Department of British Guiana, and by the I.C.T.A., Trinidad. The identification of Mr. C. Sandeman's Colombian collection was almost completed, with the help of specialists. Other collections named were a series of plants collected by Dr. A. Lemée in French Guiana, and one of *Diospyros* sent from Pará. Mr. J. S. Beard presented his important private set of specimens of trees collected in the Lesser Antilles; these were checked and incorporated. The I.C.T.A., Trinidad, presented over 2,000 sheets from the Trinidad Herbarium. This valuable accession included large sets of the Sintenis collections in Puerto Rico and of the Bang collections in Bolivia; the specimens have all been checked, and either incorporated or distributed as duplicates.

The entire representation of *Fumaria* in the Sydney Herbarium has been studied and identified.

Special work on BIGNONIACEAE: (a) The mss. of the account for the Flora of Trinidad and Tobago is still being perfected, as more material and information come to hand.

(b) Consignments of specimens sent by a number of institutions and private individuals have been dealt with. The largest was a set of specimens from Venezuela, which was sent by the Chicago Natural History Museum.

Australasia (including New Zealand, Oceania and New Guinea). As in previous years the answering of queries constituted the main part of the work, but progress was made in naming and incorporating Dr. Morrison's Western Australian collections.

The investigation of the Composite genus *Pithocarpa* was completed and published in the Kew Bulletin.

In June the Ministry approved the Director's recommendation for the appointment of a Principal Scientific Officer to devote his whole time to this area. Dr. R. Melville, formerly of the Museums' staff, was appointed to the post, and took over his duties on 1st September. Arrears of correspondence have been cleared up, and rearrangements made in several genera. Work on the Western Australian Herbarium of Dr. A. Morrison has continued.

A critical investigation of the Australian species of *Trianthema* related to *T. decandra* was begun and the vegetative and anatomical character of *Lemnaceae* are being examined by Miss M. A. Todd with a view to the discrimination of sterile material in this family.

Orchidaceae. Routine naming of living plants from the Gardens and collections from various parts of the world was actively continued. Most of the work was on African Orchids, including collections from the Belgian Congo by Fr. H. Callens and from the French Congo by Fr. H. Tisserent, as well as numerous gatherings from British possessions.

Research was continued on African orchids, with special reference to the Flora of Tropical East Africa. The Angraecoid genus *Angraecopsis* was revised and partial revisions of many other genera undertaken.

Glumiflorae. As in past years, so in 1950, much time has been devoted to the examination and identification of collections of grasses, mainly from countries of the Old World, and especially those of the British Commonwealth. Tropical African grasses have continued to receive priority and many excellent sets of specimens have been presented for naming, not only from British Territories but also from Belgian, French, Portuguese and Spanish colonies, in this way enabling us to estimate more accurately the range in distribution and variation in structure of individual species. Amongst the thousands of grasses received, numerous new species and a few new genera are being investigated and described, some of them on behalf of overseas botanists.

A survey of the new genera of the past twenty years is being carried out for the preparation of a new index of genera represented in the Herbarium.

Various other aspects of agrostology have also been dealt with, involving queries concerning the nomenclature of grass hybrids and grasses generally, the sources of plant- and seed-supply of grasses for cytological, economic and other purposes, the identification of vegetative material of grasses, the checking of lists of grasses, the causes of the death of *Spartina townsendii* in some coastal districts, grasses suitable for combating soil erosion in overseas countries, etc.

Cyperaceae. About 2,000 specimens of *Cyperaceae* have been named, mainly Tropical African from Sierra Leone, Nigeria, Uganda, Kenya, S. Rhodesia, and Portuguese East Africa. The other important collections dealt with were of British and Malaysian *Carex*.

The Revision of Malaysian *Carex* mentioned in the 1949 Review has been completed and sent to Java for publication in the Buitenzorg Botanic Gardens Bulletin. In connection with this final stage, a further thirteen new species and twelve new varieties have been described. Apart from this, research has been mainly concentrated on Tropical East African *Cyperaceae*.

Algae. Research work on the Algae of the Gold Coast has been continued and this has involved a great deal of microscopic preparation. Help has been given to botanists working on local floras, exotic algae have been checked with material in the Kew Herbarium, and answers have been given to various queries in the field of taxonomy and applied botany. The month of July was spent by Miss Dickinson in Sweden attending the 7th International Botanical Congress and participating in two algological excursions which took place along the west coast, working from the Marine Station at Kristéniberg, and along the Baltic coast amongst the islands of the Uppland Archipelago with headquarters at Oregund.

Fungi. Work on the resupinate Basidiomycetes and especially on the genus *Tomentella* has been continued, but there remain many specimens kindly lent by other institutions which it has not yet been possible to examine. Miss Wakefield attended the 7th International Botanical Congress held at Stockholm in July, as one of the Vice-Presidents of the section of Nomenclature and a member of the special committee for Fungi. Necessarily both before and after the Congress considerable time had to be devoted to problems of nomenclature.

After the Congress many distinguished mycologists, especially from America, visited Kew and worked for varying periods of time in the Herbarium. Among these may be mentioned Professor G. W. Martin from Iowa, Dr. J. A. Stevenson and Dr. W. W. Diehl from Washington, and Dr. L. Wehmeyer of the University of Michigan. Other visitors during the year included Mr. Lennart Holm of the University of Uppsala, Mr. R. L. Langdon from Australia, and Professor H. J. Brodie from Indiana.

The assistant mycologist, Dr. Dennis, returned from Jamaica in January with a collection of approximately 900 numbers of West Indian Fungi. During the summer he has been principally engaged in working out this material, a task which is inevitably prolonged as it is necessary to borrow and examine large numbers of type specimens from American and European herbaria. In October, he was fortunately able to attend the annual field meeting of the Scottish Cryptogamic Society, where he was able to collect four species new to the British Fungus flora, and to fill a number of gaps in the British Agaric collection at Kew.

Mr. P. K. C. Austwick, holding a Research Studentship from the Agricultural Research Council, continued work on the anatomy of British *Polyporaceae* and on fungi found on *Spartina townsendii*.

Spirit Collection. The collections were increased during the period by many valuable contributions, especially African, notably those of Messrs. Brenan and Meikle from Nigeria. Mr. Keay, of the Nigerian Forestry Department, sent important spirit collections of orchids from the same country, while Mr. F. C. Deighton contributed similar orchid material from Sierra Leone.

National Dianthus Collection. Miss D. E. Wiltshire took up duty as A.E.O. (temporary), to assist in work on the genus *Dianthus*, on the 1st July, 1950. Some 140 stocks, representing about 70 species, of this genus are now in cultivation.

Experimental Ground. Collections of *Silene*, *Centaurea*, *Vicia*, *Viola* (spp. *Melanium*), and *Cerastium* have been grown for study by various members of the staff, and a useful series of *Crocus* and *Colchicum* is being assembled as an adjunct to herbarium studies.

Fumigation Chamber. This has been used seventeen times during 1950. Only one or two minor insect attacks have been found anywhere in the Herbarium or Stores during the year. It is hoped that the stringent enforcement of the rules prohibiting the entry of unfumigated or unpoisoned material to the building has assisted in achieving this. These rules have been made as simple as possible. Though their application may sometimes cause a slight delay in making new material available to staff or visitors, it is essential to avoid all infection of the Herbarium collections.

Index Kewensis. The work of compilation of the Index Kewensis has gone on steadily during the past year, but there is still a great deal to be done before the Supplement (1941-50) can be closed for press-marking. A considerable number of the periodicals and independent works contained in the Kew Library have been gone through but the work to be done elsewhere is very behindhand.

Botanical Magazine. Volume 167 (N. S. tt. 89-132), edited at Kew for the Royal Horticultural Society, was published in four parts. Of the 44 articles, 36 were contributed by members of the Kew staff. Much original research has been involved in the preparation of many of the accounts. The Royal Horticultural Society has presented the coloured originals of the plates and of the black and white text figures to the Kew Herbarium.

Exhibition for Students. On the 5th and 6th of May, 1950, special exhibits were arranged for students and members of scientific societies in the three wings of the Herbarium. Members of the staffs of the Herbarium, Library, Museums, Jodrell Laboratory, and Gardens co-operated in preparing series of specimens (living and dried), diagrams, maps, books, etc., to illustrate research work recently carried out or in progress at Kew. Four hundred and seventy two visitors signed attendance during the two days.

The Library

The normal work of the Library, the relatively large number of enquiries, and other work of a bibliographical nature has occupied much of the time of the Librarian and his Assistants during the past year. The addition of another clerical officer to the Library staff has, however, afforded a certain measure of relief from the pressure of routine work.

Arrears of binding have been further reduced during the year owing to the renewal of a special grant for this purpose. About 700 volumes were sent to be bound, rebound, or repaired and the improved condition of books on the shelves, many of which were badly in need of attention, is manifest.

The question of space still remains a vexed problem and to obtain a little more shelf room the large centre tables in the front rooms on the first and second floors have been adapted to shelve books, thus relieving some of the pressure and temporarily solving the problem in these particular rooms.

As in past years, books have been lent to other Government Departments and Agricultural Bureaux, while we have also continued to administer loans from the Bentham-Moxon collection of books on *Diatomaceae* to workers on this group.

A number of books have been generously presented by their authors, by members of the staff and others, and a number have been sent to us by the publishers for review in the Kew Bulletin. The continuation of the exchange of many periodicals for the Kew Bulletin has been obtained. Other publications have been received in exchange for duplicate material. Collections of reprints, field-books, note-books, drawings, MSS., photographs and negatives from the libraries of the late E. G. Baker, R. W. Inder, A. F. G. Kerr and H. W. Pugsley have been most kindly sent to the Library.

The New York Botanical Garden, the Royal Horticultural Society, the Carnegie Institution of Washington, the Empire Cotton Growing Corporation, the Commonwealth Agricultural Bureaux, the Rothamsted Experimental Station, the Commonwealth Mycological Institute, the Forestry Commission, Natural History Societies and many Departments of Botany, Agriculture and Forestry at home, in the Colonies and overseas, have continued to enrich the Library by the presentation of various valuable publications.

Many botanical papers reprinted from periodicals have been presented by the authors, members of the staff and others, thus supplementing our large and important collection of tracts.

The map collection has been still further enriched by the War Office and the Ordnance Survey who have kindly continued to send us copies of their maps on publication.

The Museums

With the fitting of additional shelving on the top floor of Museum No. 1, it has been possible to begin the re-arrangement of the specimens in that building. For some time it has been felt that the existing arrangement has been far from satisfactory and that the material that might be regarded as purely reference material should be separated from the exhibition or display material and systematically arranged in some other part of the building not open to the general public, but where specimens would be readily available for scientific consultation. The arrangement contemplated is that the whole of the bottom floor and the greater part of the middle floor should be used for the display material and open to the public, but the top floor be reserved for the reference collection. The reference material will continue to be arranged according to Bentham and Hooker's system, but the display material will be according to subjects or uses. The display material arranged in this way will, it is felt, have greater educational value and have a more general appeal.

It was possible to re-open the North Gallery or the greater part of it to the public in the middle of June, the building having been more or less restored to a serviceable condition. The room that formerly constituted Miss North's studio is still out of commission but this does not prevent the public from having access to all the pictures in the North Collection. Interior decorations had not been completed at the time of opening but have since been completed. The pictures themselves required a good deal of attention before they could be rehung, reglazing and reframing being necessary in many instances. Owing to staff shortage and the need for economy, the building has been open to the public four afternoons a week, including Saturday and Sunday, instead of every afternoon as in pre-war years. This appears to have proved a satisfactory arrangement. It has been possible to have a guide book to the collection on sale in the building as well as postcards. Sales of both have been brisk, that of the guide book being greater than it was in pre-war years.

The installation of a new and improved type of boiler at No. 4 Museum has resulted in better heating throughout the building. It is hoped the new installation will prevent the recurrence of breakdowns in the heating system during very cold weather, as has taken place in recent years, with the inconvenience and discomfort that this causes.

The Museum Store Room at the back of the building is also now heated. This should prove a great advantage as there was formerly a tendency for some classes of specimens placed in the Store Room to develop mould.

The re-labelling of specimens in Museums Nos. 2 and 3 has been continued during the greater part of the year, except for a period when the entire absence of technical assistance meant that the work had to be held in abeyance.

Among the special exhibits placed in the Museums during the year was a fine collection of photographs of New Zealand vegetation by Mr. W. C. Davis F.R.P.S. of the Cawthron Institute and a collection of wood or lino cuts of some of the wild fowl and birds in Kew Gardens by Mrs. E. C. Paterson. Both attracted much attention from the general public.

The advisory and identification work carried out by the Department has been similar to that of previous years and has covered a wide range of economic plant products. The short supply of loofahs or loofah sponges in Britain at the present time has resulted in a large number of enquiries on their cultivation and production. In addition to its use as a sponge the loofah has various other commercial uses. The possibility of cultivating and producing loofahs in Commonwealth countries is now being considered. An article on the subject appeared in the Kew Bulletin some years ago, outlining the methods employed in Japan; this may need to be revised and brought up-to-date. The difficulty in obtaining American witch hazel bark (for medicinal purposes), due to currency restrictions, has resulted in enquiries regarding the possibility of growing and producing the bark in this country.

During the early part of the year, when coconuts again became available to the general public in the shops, a large number of 'abnormal' nuts were received from different sources. These were all found to contain the "coconut apple" in different stages of development, i.e. the

presence of the germinating embryo. Presumably consignments of coconuts had been stored too long before being released or had possibly become wet during storage. In some countries the "apple" is regarded as a delicacy and is considered to have a more delicate flavour than the ordinary meat of the nut, but this does not seem to hold with the general public of this country who prefer the normal nut.

Other miscellaneous enquiries dealt with have been concerned with—the identification of the crop contents of black-cocks (mainly ling tops and *Polygala* sp.) : identification of weeds and weed seeds from British and Commonwealth sources : enquiries on basket making and the cultivation and preparation of osiers : identification of native tanning materials from North Africa : advice on chemical methods of destroying trees : suggestions for suitable plants for use as defensive hedges in the tropics : advice on nectar sources for the hive bee in this country and abroad : the cultivation and production of saffron (*Crocus sativus* L.) : the use of madder (*Rubia tinctorum* L.) in dyeing and its cultivation : the edibility of acorns : the production and uses of galangal root (*Alpinia* sp.) : information on *Stephania cephalantha* Hayata., an Oriental medicinal plant : uses and sources of supply of ambrette seed (*Hisbiscus abelmoschus* L.) : samples of Nigerian pepper (*Piper guineense* Schum. & Thonn.) for identification and report : various drift seeds for identification : information on the commercial production of bulbs of *Amorphophallus rivieri* Durieu. : identification of impurities (seeds) found in New Zealand peas : information on West African "egushi" seeds (*Citrullus vulgaris* Schrad.) as a source of oil : the origin of the "kumara" or sweet potato (*Ipomoea batatas* Poir.) in New Zealand : information on the "karaka" tree (*Corynocarpus laevigata* Forst.) of New Zealand as a source of karakin : information on "eel grass" (*Zostera marina* L.) in connection with machinery for cutting it under water : identification of "mummy" wheat (*Triticum turgidum* L.) : identification and advice on "East African black beans" (*Mucuna aterrima* Holland.) : variation in seeds of *Abrus precatorius* L. : the uses of *Salvia sclarea* L. : information on *Guarea rusbyi* Rusby : pollination in soy beans : information on *Hydrocotyle asiatica* L. and its medicinal uses and on anise hyssop (*Agastache anethiodora* Britton & A. Brown).

Among the poisonous plants received during the year one of special interest was received from Tangier where the ripe fruits eaten by children had caused poisoning, a little girl having died while a small boy recovered after treatment. The plant proved to be *Coriaria myrtifolia* L. widely distributed in the Mediterranean Region and being known in southern France as "redoul", "redou", "rondou" or "herbe aux tanneurs". All parts of the plant are known to be poisonous but the shining black fruits, doubtless attractive to a child and possibly mistaken for blackberries, are the most dangerous. The active constituent is known to be a crystalline, bitter glucoside, coriamyrtin, which is said to resemble picrotoxin in its action on the muscles. The symptoms reported are depression followed by salivation with a slowing of the pulse, increase in respiration rate, and finally chronic convulsions. It is obvious this plant should be treated with great caution in regions where it occurs.

Good reproductive material of some of the less known Conifers was obtained from the exhibit staged by Messrs. Frank M. Wyatt and I. J.

Ferguson Lees of the Tilgate Research Station at the Royal Horticultural Society's show at Vincent Square on the 29th and 30th August. This constituted a welcome addition to the collection of Conifer cones already in the Museums.

A special study has been made by one member of the staff of the different kinds of manna known to occur in various parts of the world, these being well represented in the Museum collections. Although the interest attached to manna is mainly in connection with bygone or Biblical times some forms of manna are still regularly collected and used, mainly for sweetmeats, in certain countries, notably Asia Minor.

Special attention has also been paid to the genus *Conocarpus*, especially the little known Somaliland species *C. lancifolius* Engl. which has recently shown promise as a quick growing source of firewood and building material in sandy coastal areas, although also an inland species.

Staff

Dr. R. Melville who was appointed to the Museum staff in 1934 was transferred to the Herbarium on promotion to P. S. O. to take charge of the Australian Department.

Miss B. J. Youngman, B.Sc., was appointed Scientific Officer in the Museum Department on the 25th September.

Jodrell Laboratory

The publication, on April 6th, of the two volumes entitled 'Anatomy of the Dicotyledons' constitutes a definite landmark in the history of the laboratory. The writing of this book entailed 12 years of almost continuous work, and publication in its present form would not have been achieved without the continuous, wholehearted collaboration of Dr. L. Chalk and his colleagues at the Imperial Forestry Institute at Oxford. The book could not have been made so complete as it is without building up reference collections of microscope slides over more than two decades both at Kew and at Oxford, and without having had access to the slide collections at Yale University. Publications by Professor I. W. Bailey and his colleagues and students at Harvard University provided a most valuable source of information and inspiration in writing the book.

As usual, the routine work of the laboratory consisted, for the most part, of establishing the identity of a considerable variety of botanical material by microscopical methods. The number of timbers received for identification was rather lower than in recent years, but many of those examined were difficult or unfamiliar woods. Numerous specimens of charcoal and partly carbonized wood that had been excavated by archaeologists were received from various parts of Britain, as well as from Kenya and the Sudan. Of British material, one of the most interesting items was some fragments of suspected bones from the well known Ship Burial at Sutton Hoo, which, on microscopical examination, turned out to be oak wood (*Quercus* sp.). All the archaeological specimens were from plants closely allied to, or indistinguishable from, species that occur in the same regions at the present day.

With the continued interest in *Strophanthus* seeds in the medical world, a number of samples have been received for determination of the species. Other medicinal plants received for identification included

rhubarb " roots " that did not appear to conform exactly with any of the species that normally occur in commerce.

A number of samples of roots and rhizomes that were undermining the foundations of buildings, or which were blocking drains or water mains, were identified. In one instance a drain was found to be blocked by *Equisetum palustre*, and, on another occasion, the flow of water in a main was almost completely stopped by the roots of a Horse Chestnut. An unusual enquiry came from a firm who found what was suspected to be a 'fungoid growth' embedded in some chocolate which they had manufactured. This proved to consist of dendritic hairs of a flowering plant, which had probably become admixed with the raw material from which the chocolate had been made.

The Keeper has made a significant start with investigations into the systematic anatomy of the Monocotyledons, special attention having been devoted to the Gramineae. A considerable number of line drawings have been made to illustrate the structure of the leaf epidermis in a wide range of genera. These have already yielded information of considerable interest, and clearly confirm the view that any satisfactory classification of the Gramineae must take account of the epidermal characters of the leaf.

Mr. F. Richardson has continued, throughout the year, to prepare microscope slides for the reference collection. Besides cutting and mounting sections of numerous timbers, he has made considerable progress in preparing slides of Monocotyledons required for the investigations referred to in the last paragraph.

The recent appointment of Miss D. M. Catling as a Scientific Assistant promises to expedite and increase the output of microscope slides, and should, in due course, add materially to the completeness and value of our reference collections. It is to be hoped that the still more recent appointment of Dr. M. Stant as Scientific Officer will give the Keeper more time for research, and will add to the output of original work from the laboratory. Miss E. M. Slatter, who was employed as an Assistant Experimental Officer, left Kew in May.

It is a pleasure to record the donation, by Dr. L. Chalk, of some 400 named timber specimens from the Imperial Forestry Institute at Oxford. Most of these timbers were not previously represented in our collections, although we had very inadequate material of a few of them. Another valuable, but smaller, donation consisted of 14 specimens of unfamiliar woods which have recently come into commerce. These were presented by Mr. G. Garlick of Birmingham.

Numerous botanists from overseas made brief visits to the laboratory during the summer, chiefly on their way to or from the International Botanical Congress at Stockholm. The visitors evinced great interest in the work on systematic anatomy, and some of them promised to co-operate by supplying specimens from their respective countries. Professor Maheshwari from the University of Delhi, India, spent several weeks at the laboratory, fixing material for embryological investigation, and reading literature that was not available to him in India. Dr. K. A. Chowdbury, of the Forest Research Institute, Dehra Dun, India, also worked on wood structure in the laboratory for about 3 months. His researches were concerned with tree growth and the formation of initial and terminal

parenchyma in wood. Miss A. M. W. Mennega of Utrecht spent some 3 weeks at the laboratory working on the woods of Surinam.

The Gardens

The rainfall in 1950 totalled 29.82 inches and this helped considerably in making good the very dry soil conditions which resulted from the drought of 1949. March and October were the driest months of the year, whilst July, August and September had a steady rainfall totalling nearly 10 inches in all. From the horticultural point of view this abnormal summer rainfall was good, though it was reflected in the attendances which dropped by approximately 250,000 people below that of 1949.

The demand for technical advice continues and if anything there is a greater variety of questions asked and more varied material sent for identification than ever before. Apart from personal calls, the correspondence relating to this averages between 5,000 and 6,000 per annum.

Tropical Department

During the year, large consignments of seeds were received through the Herbarium from Mr. R. D. Meikle who collected them in the Ibadan area of Nigeria. Germination was very good and many plants have been successfully raised, providing valuable additions to the living collections, as well as material for Herbarium specimens.

Seeds of 12 different species of *Strophanthus* arrived from various parts of Tropical Africa and in addition to the plants successfully raised at Kew, both seed and seedlings have been distributed to other Botanic Gardens. Stools of *Musa* species arrived from Amani, Zanzibar and the Scott Agricultural Laboratories, Nairobi, and most of these are now well established. From suckers received the year previously, propagation has been successfully carried out, the young plants being grown on in the Banana Quarantine House ready for despatch to Trinidad during the summer of 1951. These are required for research purposes.

A Wardian case of special Cocoa clones was received from the Imperial College of Tropical Agriculture, Trinidad. They are to be propagated by vegetative means when they are sufficiently well established, and for the purpose of this and other quarantine work, a new house is being constructed in the Melon Yard, in the area formerly occupied by the old plunging beds.

It has been necessary for further research work, to get stocks of Rubber seedlings, and some 500 seeds of the Para Rubber (*Hevea brasiliensis*) were received by air freight from the Rubber Research Institute, Malaya. The seeds germinated quite freely and over 200 of the strongest seedlings were retained and are now well established. These will eventually be grown on in the new Quarantine House so that when large enough they will serve as stocks on which special high yielding strains can be worked in order to provide budwood for despatch to various places overseas.

In connection with the Groundnut Scheme, various species and forms of *Arachis* were received from Brazil. Stocks were soon established and after cuttings had been rooted they were sent through the Overseas Food Corporation to the various important centres under their control.

Ferneries. In No. 2 House the timbers on which epiphytic ferns are grown have all been renewed in view of their badly decayed condition, and a number of young *Platycteriums* raised from spores in the Fernery Pits, were used to replace some of the older specimens. Towards the end of the year two very large consignments of ferns numbering 256 in all, were received from Ceylon. They had been collected by Professor F. Manton and the Kew botanist in charge of Pteridophyta, Mr. F. Ballard, and as many of the plants received have not been in cultivation at Kew for many years, these consignments will do much to enrich the Fern collections.

In No. 1 Boiler House the old saddle-back boilers have had to be replaced and two new Crane sectional boilers have been installed in their place. It will now be possible to ensure adequate heat without undue forcing of the boilers and it is hoped that it may be possible to overcome, to some extent, the difficult conditions caused by drip and low heating.

Orchids. The display of Orchid bloom throughout the year was far above the average due, no doubt, to the excessive sunshine in 1949 which assisted in the ripening off of the pseudo-bulbs. In autumn it was again possible to set up experiments with both Neon and Mercury Vapour Lamps in order to give various resting Orchids the normal 12 hours of daylight. Previous experiments had proved that this has considerable effect in ripening the pseudo-bulbs, resulting in the production of better and more numerous flowers the following year. Of special interest amongst the Orchids which flowered profusely were *Aerides ugandensis*, *Eulophiella rolfeae*, *Paphiopedilum Wardii*, *Satyrium corufolium*, *Zygopetalum brachypetalum* and *Bulbophyllum frostii* which was figured in the Botanical Magazine.

In the South African House the raised beds in which the Succulents are grown have been resoiled and the rockstone re-arranged. Many new specimens, not previously in the collections, as well as other interesting plants, have been added, including more particularly *Euphorbia multiflora*, *E. unispina*, *Monadenium stapeloides*, *M. heteropodium*, *M. aculeolatum*, *Othonna herrei*, *Stapelia namaquaensis*, *Trichocaulon officinale* and many new species of *Conophytums*, *Haworthias* and *Lithops*.

Palm House. Some difficulty has been experienced of recent years with the heating of this large house, and during the year the installation of a new chimney flue from the sectional boilers to the base of the existing chimney stack in the stoke-hole at the north east end, has increased the efficiency considerably. This alteration has brought about an increase in the draught of the boilers and the consequent increase in the heating output when required.

The interior structure of the central portion of the Palm House has been repainted, and whilst this work was in operation the opportunity was taken to overhaul and clean the large specimen Palms. The soil in the Musa bed was renovated and new stocks were replanted. These included several good plants of *Musa Gros Michel* which had been propagated from stock received from Messrs. Elder & Fyffes. Large specimen Cycads and Palms have, from time to time, to be moved on into larger tubs and a good number of these were changed over during the summer months.

Some fine cones were produced by the following Cycads :—*Dioon edule*, *Ceratozamia mexicana* and *Stangeria eriopus*, and many Palms flowered profusely including *Arenga saccharifera*, *Chamaedorea tepejilote* and *Phoenix Roebelinii*.

Amongst the main items distributed by the department throughout the year were two Wardian cases of Cocoa seedlings I.C.S.I. to the Department of Agriculture, Malaya States ; a consignment of Cocoa seedlings I.C.S.I and *Strophanthus sarmentosus* to the Department of Agriculture, Fiji. Various species of *Strophanthus* to the Botanic Gardens at Edinburgh, Glasgow, Cambridge and Oxford, and in addition to the *Arachis* for the Groundnut Scheme, some 1,087 packets of seeds and fern spores were distributed during the early months of the year.

Alpine and Herbaceous Department

Another portion of the Rock Garden near the east entrance leading into the grounds containing the natural order beds, was taken down and rebuilt with Sussex sandstone, similar in design to that carried out in previous years. Pockets containing old exhausted soil were taken out and renewed with fresh loam, and then replanted mostly with new stock. Owing to the length of time it took to carry out this improvement, no other reconstruction work was possible.

Two more large unsightly holly trees which were covering a large valuable area of ground adjoining the south end of the Rock Garden, were removed ; the ground was then trenched and replanted with several large specimen Rhododendron bushes and a few Birch trees. It is hoped that in due course the shade provided will enable such plants as *Meconopsis* and seedling Lilies, which have been planted in large numbers, to be successfully grown.

The Alpine House again provided a continuous and colourful display of flower from spring until early summer. With the exceptionally mild spring, many of the pans of *Crocus* and other spring flowering bulbous plants came into bloom much earlier than they do in a normal season.

Among some of the more uncommon plants which flowered particularly well in the Alpine House this year, were *Iris bakeriana* and *Iris danfordiae*, two bulbous types native of Armenia and Asia Minor respectively ; *Bongardia chrysogonum* and *Plagiorhegma dubium* both curious members of the Berberidaceae family ; *Michauxia campanuloides*, a native of Asia Minor, and *Campanula formanekiana* ; *Weldenia candida*, native of Mexico and Guatamala. Mention might also be made of some good pans of outstanding seedling forms of *Ramonda Myconi*.

With the comparatively warm, dry periods during spring and early summer, many plants on the Rock Garden and elsewhere, including bulbous subjects, flowered particularly well. Those which came later in the season were not so fortunate, the weather being wet and cold, but this suited such moisture loving plants as Primulas and *Meconopsis* which made considerable growth and remained in flower for a much longer period than if the season had been a dry one. Owing to the wet season, quite a large number of plants produced very few seeds, while annuals and other late flowering herbaceous plants failed even to flower, a factor which will have considerable effect on the number of seeds available for distribution.

Several new and interesting plants were added to the Chalk Garden collection, some of which are now becoming established and seeding themselves in ever increasing numbers.

As all the beds in the Iris Garden have now been renewed with fresh soil, no dividing or replanting was necessary this year. A few new varieties, of which sufficient numbers had been propagated, replaced a few of the older ones now considered out of date.

Two good dressings of powdered chalk were spread over the beds and forked in, the first after the flowering period of Iris was over, and the second in the autumn. These dressings were given to make up for the lime deficiency and to improve the general health of the plants. Despite the wet season, little disease was found in the plants, there being no rhizome rot, which can be very destructive.

Many of the new *Nymphaeas* which had been planted the previous year in large tubs in the Aquatic Pond, made good growth and produced an abundance of flower during their season.

A number of other improvements in the department included the erection of a new and larger pot rack at the west end of the Alpine Propagating Yard.

Many valuable collections of seeds and plants were received in the department during the year, including the following :—Some 420 packets of seeds collected by Ludlow & Sherriff in Bhutan ; New York Botanic Garden sent uncommon seeds collected by Kingdon-Ward from the Manipur Hills ; Ohio Rock Garden Society contributed an interesting lot of unusual alpine seeds, while Mr. H. D. Ripley presented a choice collection of plants native to the Mediterranean regions. A collection of bulbs was received from A. Attila, who collected them in Southern Asia Minor. Mr. A. Money-Kyrle presented a collection of grasses from Finmark, N. Norway, and Miss Warren-Wilson of Reading University sent in seeds which had been collected at Jan Meyen Island in the Arctic regions. Seeds and bulbs of *Fritillaria* species were sent in both by Miss Beck and John Innes Horticultural Institution.

During the year well over 6,000 packets of seeds were distributed from the department to Botanical Gardens and various other horticultural establishments throughout the world, as well as quantities of plant material for research.

The following plants grown in the department were figured in the Botanical Magazine :—*Centaurea hypoleuca*, *Crocus ancyrensis*, *Schizocodon soldanelloides* var. *magnus* and *Lilium mackliniae*.

Arboretum

One has again to record the taking down of many of the older specimen trees, some of which have been dying back slowly for years, and others have been considered unsafe because of the manner in which they have shed large branches without warning during the summer months. In all, thirteen of the very large Beech trees have had to be removed, the majority of them being 180 to 200 years of age. The finest tree of all, which was situated some 150 yards west of King William's Temple, could not be dealt with by normal methods when the tree had been taken down and outside assistance had to be obtained to blow up the butt

by gelignite, thereby enabling pieces to be handled much more readily. This tree, which was in the region of 20 ft. girth, was possibly one of the oldest Beeches in the Gardens, and was well over 200 years old.

Some of the older Elm trees also became dangerous and the two opposite to No. 1 House, near the Main Gate, had to be topped after a very large branch had fallen on to the pathway in midsummer. Other Elms on the Mound near Cumberland Gate have shown signs of Elm disease and as several of them were badly infected, the majority have had to be scheduled for removal. This type of work has occasioned the formation of two complete groups of men, whose time is practically wholly taken up by the removal of trees, though in summer months it was possible to carry out a considerable amount of tree surgery which has been so badly neglected during the war years.

In the Pagoda Vista, 3 *Acer macrophyllum* and 1 *Acer Negundo* var. *variegata* had to be removed, whilst the largest Scots Pine in the Gardens, southwest of the Temperate House, succumbed during the year. A Monkey Winch was purchased early in the year, and this has proved a very valuable tool and labour saver in this work.

The wet season assisted considerably in the establishment of older plants which had been moved and had suffered by the drought of 1949. All young stock planted out from the Nursery into the collections came away very well and losses were remarkably few. The display of flowering trees and shrubs was again a feature of the Gardens, and Magnolias and Rhododendrons, Malus and Prunus flowered freely. It was anticipated that after the very fine season of 1949 a mild spring would have encouraged plants to flower well in advance of their normal time, but in actual fact this was not so. Snowfall late in April caused some breakage of branches of trees, and uprooted one or two of the large Rhododendrons in the Dell. It is possible that the snow was responsible for the very poor set of Malus and Prunus fruits.

The repairs to the Ha-Ha by the riverside continued, and the opportunity was taken of clearing away the old dump in the Cottage Grounds which had been there for many years. The material was used for filling and comprised clinker and soil in fairly mixed quantities. Minor alterations were made to the bank alongside the Lake. In places the levels were adjusted so that areas previously subject to flooding were brought above water level and turfed over. Some appropriate planting in places was carried out.

The Clematis Wall, constructed the previous year, was quite well furnished by the end of the summer season as without doubt the fairly heavy rainfalls assisted the Clematis to make good growth. Other work consisted of the overhaul of the Vitis collection. With the help of Dr. Melville the whole of the material was checked.

About mid-season a contract was arranged for the supply of Coffee and Chicory residue, this being delivered at the rate of about 20 tons per week. This commodity on experiment has proved valuable for mulching trees and shrubs, having the effect of retaining the moisture during times of drought, and is invaluable in keeping down seedling weeds.

Of recent years, with increased mechanisation, the number of horses has dropped considerably and the two older animals, because of failing

health, had to be destroyed. The opportunity was taken of replacing these with two Suffolk mares, one rising 7 year old and the other rising 8. Both animals have settled down well to the work and prove a valuable asset in that type of work where mechanical transport does not function so well.

Rehderodendron macrocarpum flowered for the first time at Kew, whilst it is interesting to record that seed of *Catalpa speciosa* which ripened well in 1949, germinated freely when sown the following spring. Seed of 1,815 different species of trees and shrubs were collected during the year and 6,970 packets of seed were distributed to other establishments. New additions to the 1950 seed list are :—*Diploclisia affinis*, *Ehretia thyrsoiflora*, *Eucalyptus gunnii*, *Meliosma oldhamii*, *Nothofagus obliqua*, *Nyssa sylvatica*, *Phyllodoce aleutica*, *Sinomenium acutum*, *Stuartia monadelphica*, *Therorhodon camtschaticum*.

The various plants of *Metasequoia* have grown away remarkably well. They have survived winter frost without damage and the tallest are now 5 ft. 11 ins. in height, having good straight stems and the appearance of excellent forest trees.

Decorative Department

Most Spring flowering subjects did well in 1950 and as usual the main item of interest was the Spring bedding consisting of Darwin Tulips and other subjects in the beds in front of the Palm House. Unfortunately, the picture as a whole, was rather spoilt by tulip disease which attacked a few beds at the southern end of the scheme, but this failed to altogether mar the beauty of the colour display which was the nearest yet attained to pre-war standards. In the Autumn of 1949 a large number of the beds were resoiled and this undoubtedly helped to reduce the disease in this area.

Later in the season the rather wet summer kept the whole of the lawns in good condition, and at no time were these burnt brown as is the custom in normal years. Most summer bedding plants made a bold display, and the Dahlias in particular after making a good deal of growth, flowered very profusely until frost came. Near the pond the beds of tuberous Begonias again aroused much interest amongst the visitors, and the cooler conditions which prevailed suited them. In addition to the Dahlias in the Broad Walk, beds of zonal and ivy leaf Pelargoniums, Penstemons, Heliotrope, Fuchsias and other such like plants made a colourful display all through the summer.

The wet season brought about marked improvement in the Rose Garden and the additional atmospheric moisture not only kept down insect pests but also helped considerably in keeping the foliage healthy and clean. Additional feeding and soil mulching has undoubtedly improved the plants whilst an effort is being made to reduce the amount of hard pruning, as it is felt that in this way a greater display of bloom will be obtained. First year experiments have been quite promising, as of those carried out with the use of chalk at the rate of 4–8 ounces per square yard. Two beds of a variety Peace were planted at the same time and in the same soil, but to one chalk was added in the quantity stated, and without doubt the growth made the first year by these plants was much healthier in appearance, and the flowers more numerous and

larger than those in the untreated beds. This has led to further experiments with the beds of Mary Wheatcroft and R. S. Hudson which were planted some years ago, and which have made more or less uniform growth up to date.

In the Conservatory the early spring display was depleted by the absence of Cyclamen and by the lack of adequate forcing material. This side of the Department's work had been rather neglected during the war years, and in Autumn a fresh intake of plants was arranged to permit of the pre-war standard being once more achieved. *Primulas*, *Cinerarias*, *Calceolarias*, *Streptocarpus* and *Pelargoniums* flowered well in the Conservatory throughout the year, but disease in the varieties of *Begonia* reduced their effectiveness for greenhouse display. It is anticipated that most of the stocks will have to be renewed.

The cooler conditions definitely suited Chrysanthemums, and the show this year exceeded anything seen for many years, both Japanese and decorative varieties were exceptionally good, and it was a pity that the very high degree of humidity in November and early December caused a great deal of damping off amongst the blooms. The Cascade and Charm varieties of Chrysanthemum were again a fine picture, and aroused much interest amongst the visitors.

Various repair works have been carried out during the year, and in House No. 18G a partition has been erected to divide it into two sections. This allows one part of the pit being kept at a higher temperature than the other which will greatly facilitate the cultivation of Cyclamen, Primulas and other plants. New concrete stages were built in Houses No. 20 and 20A these taking the place of the old slate benches which were in bad repair. House Nos. 18G, 18H, 18I, and 20a have all been painted making a marked difference to the light reflected during the Autumn and Winter months.

The demonstration plots of fruit and vegetables were once again maintained by the Department and despite the number of allotments which have been handed back to normal use, there is still a great interest by visitors in the work carried out.

Temperate House

The outstanding item of interest during the year was the flowering and fruiting of *Jubaea spectabilis*. This plant owing to its size had to be moved some ten years ago since which time it has taken on a new lease of life which culminated in its flowering and fruiting. Another plant of great interest which flowered was *Raphis humilis*. In early Spring the forcing material of Forsythias, Azaleas, Prunus, Malus and many others made a welcome splash of colour, whilst later the Rhododendrons in the Himalayan House despite painting operations, made a good display. Some of the Rhododendrons had become weaker and consequently the opportunity was taken during the early part of the year to replant a considerable portion of the house.

At the southern end, the Mexican House and South Octagon were repainted, and despite the use of modern scaffolding methods a great deal of damage occurred. The painting operation necessitates the stripping down of all climbers, and plants trained to pillars, walls or roof, and afterwards it is impossible to replace them without a great deal of hard pruning..

Of recent years considerable difficulty has been experienced with the heating system, and in very cold weather the temperatures have fallen far too low. New and larger boilers have been installed as well as electric circulating pumps with the result that great improvement is now apparent.

The re-bedding of the glass above the side stages around the central portion of the house is nearly completed, and this will obviate the constant drip which for years now has tended to kill off a remarkable number of plants which of necessity have to be grown in pots. Constant flooding of the soil surface, and too much atmospheric moisture, being more than the plants could stand, but now with both of these factors overcome it should again be possible to grow these young plants with only occasional loss.

Two of the main features of flowering plants in the house have been those of Fuchsias and Camellias. The old and new varieties of Fuchsia attract a great deal of attention, and the many fine baskets exhibited during the summer months, show the public how these popular plants can be grown to advantage. With the Camellias, the same interest applies, as in addition to the flowering of *Camellia reticulata*, which is now about 100 years old, some of the newer varieties and species have been introduced to merge in with the old. Most of these old and new varieties are very decorative, and flower over very long periods when grown in this way.

In mid summer a commencement was made on the New Australian House which occupies the site due west of the central steps of the existing house. Several Hollies had to be moved to allow for the construction to begin and by the end of the year the footings and brick base were in position. The superstructure is to be of aluminium and glass, a departure from old methods of house construction. Some delay has occurred in the building of the aluminium sections, and it is not anticipated that the house will be ready for use until mid summer of 1951.

Economic Botanist

Sir Geoffrey Evans continued in this office throughout the year. He dealt with correspondence from the Colonies and overseas that concerned economic matters. In recent years special attention has been drawn to the need for breeding better varieties of tropical crops in the Colonies, particularly for yield, improved quality and disease resistance. Virus diseases, for example, are becoming more prevalent and as a result Experimental Stations have been established in the producing Colonies with the main object of breeding new varieties. This has led to the realisation of the need for stricter quarantine measures, since it is obvious that it will not be worth while introducing new and better varieties into another colony if there is any risk of at the same time introducing a new disease.

The policy of studying quarantine measures has therefore been adopted and the Director has agreed that the Royal Botanic Gardens should function as an intermediate quarantine station. The three major crops considered of special economic importance at the present time are rubber, cocoa and bananas, and each of these is subject to certain virulent diseases. The breeding and selection work will be carried out in the tropics at research stations that have been established in the West

Indies, West Africa and Malaya. The function of Kew is to act as an intermediate quarantine station for the new species or varieties required by the plant breeder that are in process of transfer from one of these regions to another. Work of this kind has been undertaken by Kew on a small scale for some years past, but the greatly enlarged traffic envisaged has necessitated the erection of a specially designed Quarantine House, and this is now being erected in the Melon Yard. The problems involved in the methods of transfer of plant material over long distances are also being investigated in some detail. Funds for the new House, and the necessary staff, have been provided by a Colonial Development and Welfare grant, and it is intended to take care of rubber and cocoa introduction only. Bananas are already provided for in the small house which was erected some years before the war, although this may prove inadequate if the traffic in this particular plant increases. The methods involved in each case necessitate the propagation by seed, rooted leaf or stem cutting, or budding for at least one generation at Kew, and the inspection of the plants growing in quarantine at regular intervals by officers of the Commonwealth Mycological and Entomological Institutes, who are closely co-operating in the project.

In addition to representing the Director on many committees of the Colonial Advisory Council for Agriculture, Animal Health and Forestry, of which he is a member, the Economic Botanist also continued to be Chairman of the Anti-Locust Research Committee and also a Governor of the Imperial College of Tropical Agriculture.

Much time was also devoted to the National Pinetum at Bedgebury, and he was re-elected Chairman of the Pinetum Committee. It has proved possible to effect certain improvements and to enlarge the scope of the Pinetum. The whole area has been mapped and the position of the various species and most of the individual trees indicated. It has also been found possible to replace certain species which were lost during the war period. A check on the old labels has been carried out by Dr. R. Melville, whose services in this connection were much appreciated.

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A Dictionary of Assyrian Botany*—The many and varied works of reference which are so indispensable to scientific workers will be enriched by the publication of this scholarly work by the late Dr. Campbell Thompson. This dictionary of Assyrian botany will be of particular interest to philologists and to botanists who frequently wish to identify plants from the names given to them by the Assyrians in ancient times. The material for this book, left by the author who died eight years before its publication, has been ably edited by the Keeper of the Egyptian and Assyrian Department of the British Museum who has devoted much care to the preparation and arrangement of the MS. for publication. The book is divided into a number of chapters on grasses, rushes, reeds, vegetables, purgatives, poisonous and allied plants, narcotics, trees and fruits, vines, gums, gum-resins, etc. In addition to the interpretation of the plant names it contains much useful and interesting information on the ancient uses of the plants themselves. The book is very fully provided with excellent indexes which include those in Sumerian, Akkadian, Hebrew, Aramaic and Syriac, Arabic, Latin, Greek, and English, with shorter references in Ras Shamra, Phoenician, Persian, Sanskrit, Indian, Egyptian, Hittite and other dialects.

H. S. MARSHALL.

*A Dictionary of Assyrian Botany. By the late R. Campbell Thompson. London : The British Academy. 1949. Pp. xv + 405. Price 50/-.

Swiss Alpine Flowers*—An English translation of Walter Rytz-Miller's "Swiss Alpine Flowers" by W. T. Stearn was published in 1949. The introduction begins with a definition of an alpine plant followed by paragraphs on temperature, period of growth, solar radiation, and natural associations. After the introduction each page of text is accompanied by a coloured plate of the plants described arranged according to the colour of the flowers. Plants with green or greenish flowers are described first followed by those with white ones, then those with varying shades of yellow, red, violet and blue. In describing the plants the Latin names are given first, then the German and French names followed by the English name if one is known and the botanical family to which the plant belongs. Months of flowering are given at the end of the descriptions. An index of English and scientific names is provided.

In such a small book it has not been possible to include more than the commonest and most widespread species but even so 125 have been figured in 28 coloured plates. This handy little book which can easily be carried in the pocket will be welcomed by all interested in alpine plants and particularly by those who are fortunate enough to visit the native habitats of these charming little plants.

H. S. MARSHALL.

*Swiss Alpine Flowers by Walter Rytz-Miller. English translation by W. T. Stearn. Hallwag A.G., Berne. (Wieldon & Wesley, London). 1949. Pp. 64 ; 28 col. pls. Price 7/6.

BORIS ALEXEIEVITSCH FEDTSCHENKO.

The following notice of the death of Professor B. A. Fedtschenko has been received from Professor Al. A. Federov, Acting Director of the V. L. Komorav Botanical Institute of the Academy of Sciences of the U.S.S.R.

"Boris A. Fedtschenko was born 27 Dec. (old style) 1872 and died Sept. 29, 1947, in Leningrad. While at school Fedtschenko showed interest for nature, under the influence of his mother—who was an outstanding traveller and botanist. In 1892–1896 as a student of Moscow University he took part in the botanic excursions of his mother to the South Urals, Crimea, Caucasus and Middle Asia. In 1897 Fedtschenko undertook his first independent travel to the Middle Asia (Turkestan) and since that time on the study of the plant cover of the Middle Asia became the chief object of his investigations during forty years ; in 1934 he made his last travelling to the Middle Asia, where he investigated the flora of Tadzhikistan.

In 1900 Fedtschenko began working in the Petersburg Botanic Gardens, now Botanical Institute of the Academy of Sciences of the USSR, where he was at first the curator of Turkestan Herbarium and in 1905 he was promoted to the post of the chief manager of Herbarium of our Institution and held this post until 1932. During these years the Herbarium was greatly enriched with collections gathered by a great number of expeditions to the Middle Asia, Siberia and Far East organized by Fedtschenko. During his lifetime Fedtschenko published a great number of investigations particularly dealing with the flora of the Middle Asia. He was initiator of writer (composing) the Flora of the USSR, and he was also the author of the first scheme of this Flora (1929). Later he was one of the most active authors of this voluminous publication. Detailed information regarding Fedtschenko life and work was published by the late R. J. Rojevitz in 1940, on the occasion of his 70 anniversary in 'Sovetskaja Botanica', 1940, no. 3, with the list of his works (nn. 1–326) and publications edited by him (nn. 1–24). Later on (1940) Fedtschenko published some other floristic works and wrote for the Flora of the USSR the fam. *Berberidaceae* and gen. *Megacarpa*, *Hedysarum*, *Vicia*, *Lens* and *Lathyrus*".

Professor Fedtschenko frequently corresponded with Kew and in 1947 sent a copy of his portrait which has been placed in our portrait collection. He visited Kew to study in the Herbarium in 1910, and again in 1914.

H. S. MARSHALL.

School Gardening in the Tropics.*—Originally based on a series of lectures delivered in 1921 to Elementary School Teachers in Trinidad, this useful little book now reaches its third edition. It has been completely revised, additional information has been added and some parts have been entirely re-written. The book deals with all phases of school gardening in the tropics and contains chapters on Hedges, Fences, Paths, Tools, Manures, Propagation, Pruning, Plant Pests, etc., which should prove invaluable to anyone having an interest in the subject. A list of the common names of plants mentioned in the book with their botanical equivalents is provided in an appendix. H. S. MARSHALL.

*School Gardening in the Tropics. By R. O. Williams. Ed. 3. 1949. Pp. 143. London : Longmans, Green & Co. Price 3/-.

CORIS (PRIMULACEAE?) IN SOMALILAND.

H. K. AIRY SHAW.

Coris monspeliensis L. (1753, p. 177) var. **longinqua** Airy Shaw, var. nov., ut videtur var. *maroccanæ* Murb. (1898, p. 2) f. *denticulatae* Lindb. (1932, p. 116) (e descr.) proxima, sed tota fere planta colore intense roseo-purpureo obducta, habitu nano compacto a basi ramoso, inflorescentiis abbreviatis praecipue differt.

Herba suffruticosa nana, ut videtur perennis, 1·5–5 cm. alta, usque 8 cm. diametro, e basi ramosa, ramis late patentibus corymboso-cymosim adscendentibus in hemisphaeram coordinatis, caule ramulisque minute papilloso-puberulis. *Folia* linearia vel lineari-spatulata, 7–12 mm. longa, 0·5–1·5 mm. lata, saepe conspicue subremote repando-dentata, dentibus primum longe setuliferis demum muticis interdum sub apicem obscure fusco-glandulosis, ceterum sinuosa rarius subintegra, apice subacuta usque subobtusa, basi sensim et longe attenuata, supra tenuiter canaliculata, nervis omnino immersis, glaberrima nisi subtus basin versus papillis raris minutis interdum adpersa. *Racemi* breviter vel brevissime cylindrici, 1–2 cm. longi, 1–1·3 cm. crassi, axi minute puberulo, usque circiter 15-flori, pedicellis brevissimis. *Calyx* zygomorphus, late sphaerico-campanulatus vel suburceolatus, 5–6 mm. longus, 3–4 mm. latus, basi conspicue albida rotundata usque subtruncata, submembranaceus, minute glanduloso-puberulus, costis 10 prominentibus, dentibus 5 (3 inferioribus majoribus, 2 superioribus minoribus) deltoideis valvato-conniventibus circiter 2 mm. longis dorso more generis macula nigra (? glandulosa) conspicue notatis (macula dentium 3 majorum quam 2 minorum multo majore) intus breviter et densiuscule albido-ciliolatis, annulo setarum 11 validarum spinosarum patentium calycem infra basin dentium cingente, setis 5 majoribus cum dentibus calycinis alternantibus, 6 minoribus per paria dentibus calycinis oppositis. *Corolla* anguste cylindrica, tota 7·8 mm. longa, tubo 5 mm. longo 1 mm. diametro, segmentis lineari-spatulatis 2–3 mm. longis 0·7 mm. latis apice altiuscule et acute bifidis, segmento uno ceteris brevior, pallide rosea. *Stamina* paullo infra medium tubum inserta, filamentum unius 1 mm., duorum proximorum 1·5 mm., reliquorum vix 2 mm. longo, 4 longiora apice incurva, antheris parvis globosis. *Ovarium* oblongo-ovoideum, circiter 1·5 mm. longum, apice subtruncatum, glabrum. *Capsula* depresso-globosa, 3–3·5 mm. diametro, minute patentim puberula. *Semina* in capsula circiter 12, quorum 9 sterilia et 3 fertilia, haec atro-brunnea, oblongo-ovoidea, \pm 1 mm. diametro.

SOMALILAND. Surud Range, Shimba Beris, lat. 10° 45' N., long. 47° 12' E., in sun among stones on one of the uncommon outcrops of rocky, almost earthless surface, in forest of *Juniperus procera* Hochst., rare, 2025 m., 17 Dec. 1929, *Collenette* 364 (typus, Herb. Kew.) : "Plant of 2 ins. Flower pink." *Ibid.*, Dalo Forest, on barren limestone hillock, 10 April 1945, *Glover & Gilliland* 932 : "Tiny plant with purple leaves and red, purple and white flowers".

The discovery of a form of the polymorphic *Coris monspeliensis* in a remote locality two thousand miles from the nearest point of its known range is of considerable interest. It is also of interest that the particular form represented should, in spite of its isolation, fall well within the morphological

range of the species. One of the striking features of the variation observed in *Coris* is what might be termed the looseness of its texture : the forms, varieties and subspecies that have been recognized are exceedingly ill-defined—their number could probably be doubled without difficulty—and appear to represent merely re-shufflings of a limited assortment of genes, with very little correlation.

The present form seems to come nearest to var. *maroccana* Murb. in its small, cylindric corolla, subglobose calyx and anthocyanin development (the latter is seen only slightly in var. *maroccana*, but apparently not at all in the other forms). It is noteworthy that var. *maroccana* comes from the opposite extreme of the geographical range of the species. The form from Lower Egypt described by Gauba (1934, p. 266) as subsp. *Strossiae* is distinguished, like vars. *maroccana* and *longinqua*, by the small size of the corollas (4–7 mm. long), but in that form they are almost actinomorphic, and the segments are relatively very short and broad.

The altitude, over 2000 metres, at which var. *longinqua* occurred appears to be considerably greater than that reached by any other form of *C. monspeliensis*. The *Juniperus procera* forest in which it was found is described and illustrated by Collenette (1931b, p. 409, t. IX, lower photograph ; see also 1931a). Gillett's (1941) account of the vegetation of Western Somaliland does not quite extend to this region.

In the Dalo Forest, where Gilliland collected it (probably barely a mile from Collenette's locality), it was accompanied by *Viola somalensis* Engl., *Vernonia cryptocephala* Baker, var.,* and *Lasiosiphon somalensis* (Franch.) H. H. W. Pears., all very restricted endemics so far as known. *Viola somalensis* is a member of the small isolated section *Sclerosium* W. Becker, which includes *V. etbaica* Schweinf., *V. cinerea* Boiss. and *V. Stocksii* Boiss., extending from Nubia and Somaliland to Sind in W. India. *Vernonia cryptocephala* is a species possibly referable to the section *Lepidella* Oliv. et Hiern, but without any clear specific affinity, except perhaps a remote one with *V. atriplicifolia* Jaub. et Spach (Abyssinia to Arabia). *Lasiosiphon somalensis* (*Thymelaeaceae*) is an apetalous species related to the similar East or South African *L. Vatkei* Engl. and *L. polycephalus* H. H. W. Pears.

For a discussion and analysis of the floristic affinities of the neighbouring island of Socotra, to which the flora of Somaliland shows many similarities, see Balfour's classic work (1898, especially pp. xlix–lix). It will be seen from this that the distribution of *Coris* can be more or less paralleled by that of several Socotran endemics and their closest allies, e.g. *Carum pimpinelloides* Balf. f. (Socotra) and *C. dichotomum* Benth. et Hook. f. (Morocco), *Valerianella affinis* Balf. f. (Soc.) and *V. divaricata* Lange (Spain), *Teucrium petiolare* Balf. f. (Soc.) and *T. buxifolium* Schreb. (Spain), *Euphorbia arbuscula* Balf. f. (Soc.) and *E. aphylla* Brouss. (Canaries), *Securinea schweinfurthii* Balf. f. (Soc.) and *S. buxifolia* Muell. Arg. (S. Europe), *Dipcadi balfourii* Baker (Soc.) and *D. serotinum* Medik. (Mediterranean), *Urginea porphyrostachys* Baker (Soc.) and *U. anthericoides* Steinh. (Algeria), etc.

**Vernonia cryptocephala* var. *concinna* Airy Shaw, var. nov., statura multo humiliore, caulibus 2–4 cm. tantum longis, foliis minoribus rhomboideo-ellipticis 3–8 mm. longis 1·5–3 mm. latis, capitulis duplo minoribus 7–8 mm. longis et latis, insigniter (an specifice ?) differt.

SOMALILAND. Dalo Forest, on limestone ledge of barren hilltop, 10 April 1945, *Glover & Gilliland* 931 : "Fls. purple".

The genus *Coris* should probably be constituted a distinct family*. While it has a number of points in common with the *Primulaceae*, it shows some significant features also of the *Lythraceae*, and in fact stands more or less midway between these two families. As Agardh (1858, p. 332) has pointed out, the calyx of *Coris* is almost exactly that of *Lythraceae*, and the curious magenta-pink colour of the corolla is peculiarly 'Lythraceous.'

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*Cf. Duby (1844, p. 429 ; repr. p. 36) : "Il est surprenant qu'aucun faiseur de familles n'ait encore jeté son dévolu sur ce genre, pour en faire une famille distincte". —It may be pointed out that the name of the family would be *Coriaceae*, not *Coridaceae*, since there is no *d* in the stem of *Coris*. The spelling of the tribal name *Corideae*, from Reichenbach (1831, p. 410) onwards, and the epithet *coridifolia* given to species of other genera, are strictly without etymological justification.

The Art of Botanical Illustration*—The appearance of this book, the first of its kind to deal with the subject in a comprehensive manner, will be warmly welcomed. Within its pages the author traces the history of botanical illustration from the earliest times, a task involving a great deal of patient research and requiring a profound knowledge of the subject.

It appears that it was not until their medicinal properties were generally realised in a scientific way with the advent of the herbal, that plants were portrayed more frequently and accurately. Previous use of them had been in an occasional way, merely for decorative purposes, with little

attempt to portray them with any degree of naturalism. This naturalism in plant illustration, however, developed at the end of the fourteenth century and Mr. Blunt in his book discusses the various schools and traces for us the development of each. Attention is drawn to the occasional decoration of French manuscripts of the early and mid-fifteenth century with borders of flowers, and the "Books of Hours" decorated with attractive floral borders of considerable beauty, some of which were of a botanical character, although it is doubtful whether these could be correctly classified as botanical illustrations.

The author introduces us to the age of the first printed herbals where the art of the woodcut was so extensively practised in illustration. Such illustrations are discussed from the earliest cuts employed in the Herbarium of Apuleius Platonicus and those of the *Ortus Sanitatis* to the illustrations used in the herbals of Brunfels and Fuchs. In those days many of the woodcuts were placed in a common pool and it was from such a pool that the blocks were drawn to illustrate the Herbals of Dodoens, de l'Ecluse and de l'Obel. In the chapter on the decline of the woodcut we learn with interest that the last book of importance to be illustrated by wood blocks was Rudbeck's *Campi Elysii*, publication of which began at Uppsala in 1701.

With the passing of the wood block Mr. Blunt takes us to the late sixteenth century and introduces us to some flower-painters of that period, to the use of metal plates for the making of illustrations for flower books and to the employment of line engraving and etching. A chapter is devoted to the age of Ehret and his influence on the art of botanical illustration during the eighteenth century. Our attention is drawn to that unique periodical, the "Botanical Magazine", and the various artists who prepared the illustrations from its foundation to the present day. The author has much of interest to tell us of the brothers Francis and Ferdinand Bauer, the botanical artists who, like Ehret, were of German birth, and of the genius of the most celebrated flower painter of his day, Redouté, famous for his illustrated works including the well-known "Les Roses" and "Les Liliacées".

Botanical illustration in the East seems to have developed much earlier than in the countries of the West and Mr. Blunt points out that the Chinese and Japanese artists approach the "painting of flowers with a humility that is rarely encountered in the west". So on to the end of this excellent work our interest is held while the author describes the botanical art and the flower painters of the early and late nineteenth century, the age of the lithograph, the twentieth century and the modern school.

The book is well printed with selected illustrations reproduced with care, but, most unfortunately, the colour reproduction is poor and in few cases does it do justice to the original. The author is to be congratulated upon producing a book full of learning and valuable information, which will ever be a source of pleasure to all botanists, gardeners and artists, and indeed to all those interested in plants and their portrayal in illustration.

H. S. MARSHALL.

*The Art of Botanical Illustration. By Wilfrid Blunt with the assistance of William T. Stearn (New Naturalist Series). Pp. xxxi + 304, 47 col. and 32 uncol. pls. London : Collins, 1950. Price 21/-.

CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA :
LII*.

NEW MALPIGHIACEAE FROM BRITISH GUIANA.

N. Y. SANDWITH.

Examination of the *Malpighiaceae* collected in British Guiana during the late war by Mr. D. B. Fanshawe, Assistant Conservator of Forests, has resulted in the recognition of two new species which are described below. In the course of the investigation of one of them the writer was compelled to reconsider the taxonomic status of the monotypic genus *Dolichopterys* Kostermans, of Surinam, and was led to the conclusion that it should be reduced to the genus *Lophopterys* Juss.

Hiraea adenophora Sandwith, sp. nov. ; *H. transienti* Ndz. affinis, foliis haud obovatis venulis utrinque magis elevatis, forma inflorescentiae, pedicellis brevioribus, bracteolis glandula conspicua interposita postice munitis, petalis anterioribus magis fimbriato-dentatis differt ; ab *H. affini* Miq. forma foliorum inflorescentiaeque, petiolo longiore, glandula inter bracteolas interposita, samarae crista dorsali bene evoluta facile distinguitur.

Frutex scandens ; ramuli pilis canescentibus arcte adpressis dense pubescentes, vetustiores inconspicue lenticellati, juniores apicem versus conspicue compressi ; internodia 2.5–6 cm. longa. *Folia* elliptica vel ovata, apice breviter late acute acuminata, basi late rotundata rarius cuneata, 6–12.5 cm. longa, 3.5–8.8 cm. lata, chartacea, siccitate olivacea vel brunnea, marginibus dimidio superiore glandulis sessilibus paucis saepe obscuris praeditis, supra primo secus costam (hic dense et conspicue) nervosque primarios canescenti-pubescentia demum glabra, subtus similiter induta praeterea pagina juventute sparse pubescente, costa nervisque primariis supra plus minusve canaliculato-impressis subtus prominentibus, secundariis ut in speciebus affinibus a sese 3–5 mm. distantibus inter primarios saepius plus minusve irregulariter descendentibus et quam venulis prominentius elevatis nec ut in *H. fagifolia* (DC.) Juss. approximatis subhorizontaliter parallelis, his cum venulis rete intricatissimum pulcherrimum utrinque sed praesertim subtus satis elevatum formantibus, primariis utroque costae latere 8–10 sursum angulo praesertim inferne satis lato arcuatis ac anastomosantibus ; petiolus 1–2 cm. longus, ad 2.5 mm. diametro, supra canaliculatus, velut ramuli dense adpresse canescenti-tomentosus, siccitate saltem saepe flexuoso-curvatus, apicem versus glandulis duabus conspicuis praeditus ; stipulae non visae. *Inflorescentiae* axillares vel ramulos breves terminantes, paniculas ex umbellis 4-floris secus axem brevem 3–5 racemosis compositas formantes, 1–4 cm. longae, ubique adpresse canescenti-tomentosae, costatae sulcataeque ; bractae primariae ovato-lanceolatae, concavae, acutae, 2.5–4.5 mm. longae ; pedunculi umbellarum 4–9 mm. longi ; umbellae basi bracteatae ; pedicelli ad 1 cm. longi, basin versus bracteolati, scilicet hic articulati et sub bracteolis per circiter 1 mm. incrassati ; bracteolae ovatae, obtusae, concavae, circiter 1 mm. longae atque latae, inter se postice glandula conspicua brunnea 1 mm. diametro (forsan margini bracteolae alterae affixa) sociatae. *Sepala* ovato-lanceolata, obtusa, apice demum recurva, 3–4 mm. longa, 2–2.5 mm.

*Continued from K.B. 1950, p. 136.

lata, extra adpresse pubescentia ; glandulae 8, pallide flavae, orbiculares vel orbiculari-oblongae, 1.3–1.6 mm. longae. *Petala* flava, glabra, membranacea, 4 anteriora lamina basi kermesino-vittata ovato-orbiculari ad 5 mm. longa ad 4.5 mm. lata breviter fimbriato-dentata basi cuneata ac in unguem 2.5 mm. longum decurrente ; quintum posticum lamina late rhomboideo-ovata, circiter 3.5 mm. longa atque lata, valde fimbriato-laciniata laciniis apice glanduliferis ad 1.5 mm. longis, ungue fere 2.75 mm. longo. *Stamina* filamentis inaequalibus glabris 2–3 mm. longis basi coalitis ; antherae oblongae circiter 1 mm. longae, loculis parallelis, connectivo tumido glanduliformi subgloboso. *Ovarium* dense griseo-tomentosum ; styli plus minusve sigmoideo-flexuosi, 3–4 mm. longi, dimidio inferiore pubescentes, dorso apicis breviter subrecte calcarati vix uncinati. *Samarae* cuiusque nux circiter 5 mm. diametro, pubescens ; alae laterales membranaceae, 3–4 cm. altae, vulgo 2.5 cm. latae, siccitate stramineae, flabellato-venosae, oculo nudo glabrae sed revera sub lente pilis adpressis arachnoideo-subsericeis dense pubescentes ; crista dorsalis conspicue evoluta, 2–3 mm. lata, dense pubescens, sub-integra vel irregulariter praesertim triente superiore lacerata. *Semen* cotyledonibus inaequalibus, majore minorem velut in cunis involvente.

BRITISH GUIANA. Dukaliku Creek, Berbice River, fl. March 31st, 1938, *D. B. Fanshawe* in *Forest Dept.* no. 2682 (type in Kew Herb.) : climbing rope, with minor veins of leaves prominent on lower surface ; calyx dull brownish green with darker indumentum, lobes revolute when mature, paired glands pale yellow, waxy ; petals with yellow claw, lamina frilled, fimbriate, streaked with crimson at base ; filaments pale green, anthers pale cream. Groete Creek, Essequibo River, fr. March 4th, 1944, *id.* in *Forest Dept.* no. 4485 : 4 cm. diam. dimpled brown soft rope, in mixed "ropy" forest on lateritic soil ; leaves chartaceous ; fruit greenish with two broad, mealy green, membranous, softly hairy wings. Bartica–Potaro road, 51st mile, in wallaba bush on white sand, fl., *A. Dawson* in *Forest Dept.* no. 2010 : climber with small, bright yellow flowers (no date on label). Barabara Creek, Mazaruni River, fl. March 18th, 1948, *D. B. Fanshawe* in *Forest Dept.* no. 5604.

The species of *Hiraea* are apparently critical, and are frequently misidentified. The above plant presents characteristics repeated in four separate collections which have not been found in combination in any other species.

Lophopterys euryptera *Sandwith*, sp. nov ; a *L. splendens* Juss. atque *L. surinamensi* (Kosterm.) *Sandwith* nervis foliorum chartaceorum primariis utroque costae latere magis numerosis secundariis magis subparallelis, praeterea pagina inferiore magis griseo-argentea indumento e pilis minimis densis additis aliis majoribus malpighiaceis sparsis longitudine 0.5 mm. haud attingentibus constituto differt ; praecipue ab illa alis samarae lateralibus conspicue evolutis, ab hac alis his multo latioribus distinguitur.—*L. splendens* Juss. var. *obovata* Ndz. in Engler, *Pflanzenreich*, 4. 141, p. 385 (1928). *L. splendens* "Juss." Benth. in Hook., *London Journ. Bot.* 7, 127 (1848), descr. e floribus exempli Schomburgkiani confecta.

Frutex scandens ; ramuli angulati vel saltem compressi, pluricostati sulcatique, dense adpresse griseo-tomentosi. *Folia* obovata vel obovato-oblonga, apice truncata vel truncato-rotundata insigniter abrupte breviter

(0.3-1.3 cm.) acute cuspidata, basi vulgo obtuse cuneata ac in petiolum decurrentia nonnunquam acuta vel etiam fere rotundata, 13-32.5 cm. longa, 6.5-16 cm. lata, firme chartacea, supra siccitate brunnea nitidula costa inferne pubescente excepta glabrata, subtus griseo-argenteo-subsericea pube e pilis minimis arcte adpressis superpositis aliis majoribus malpighiaceis sparsis longitudine 0.5 mm. haud attingentibus sub lente forti tantum distinguendis constituta, nervis primariis lateralibus utroque costae latere 14-17 a sese 0.8-3 cm. distantibus ascendentibus atque marginem versus arcuato-anastomosantibus, his cum costa supra planis vel canaliculatis subtus valde prominentibus, secundariis regulariter subparallelis flexuosis cum venulis rete intricatissimum praesertim supra obvium praebentibus ; petiolus ad 3 cm. longus, dimidio inferiore in-crassatus ac infra conspicue costatus atque sulcatus, indumento ramulorum praeditus ; stipulae haud visae. *Racemi* vulgo 12-18 cm. longi, paniculam terminalem pyramidatam ad 30 cm. longam 25 cm. latam ubique brunneo-tomentosam efformantes, bini infimi axillares pauciramosi ; pedunculi floriferi subnulli, ad gibbum sub bracteis bracteolisque reducti ; bractee bracteolaeque basi pedicellorum persistentes, illae ovato-lanceolatae 2-3 mm. longae, hae paulo minores ; pedicelli 4-6 mm. longi, crassi atque sursum ampliati. *Sepala* deltoideo-ovata, 2.5-3 mm. longa, 2.5-3.5 mm. lata, extra dense pubescentia ; glandulae 4, orbiculares, 2.5-3 mm. diametro, radiatim sulcatae. *Petala* flava, glabra, 4 anteriora lamina late rhomboideo-ovato-orbiculari circiter 6.5 mm. longa atque 8 mm. lata brevissime obscure denticulata, in unguem late alatum 2.5-3.5 mm. longum decurrentia ; petalum quintum orbiculari-ovatum vel elliptico-oblongum, 2.5-3 mm. longum, 2-3 mm. latum, conspicue fimbriato-laceratum, in unguem brevioris vix alatum decurrens. *Stamina* filamentis glabris basi coalitis, circiter 2.75 mm. longis, infra ad 0.75 mm. latis sursum sensim attenuatis ; antherae oblongae, 1.5-2 mm. longae, glabrae, loculis infra connectivum productis haud appendiculatis, connectivo oblongo tumescente. *Ovarium* tomentosum ; styli circiter 1.5-3 mm. longi, apice dilatati, basi tantum villosi. *Samarae* nux globosa, 1-1.2 cm. diametro, adpresse tomentosa, infra alas pluricostata costis saepe inconspicuis ; ala dorsalis (vel crista) nucem circumdans, subcoriacea, integra, latere superiore 1-1.4 cm. alta rotundata, basi ad 2 cm. longa, adpresse pubescens ; alae laterales porrectae, subcoriaceae, subobovato-oblongae, 4.5-5 cm. longae, 1.4-1.8 cm. latae, adpresse pubescentes ; alulae singulae irregulares (saepe ad gibbos reductae) ad 1.5 cm. longae prope mediam basin alarum lateralium latere superiore nonnunquam evolvuntur.

BRITISH GUIANA. Barama River (*teste* Niedenzu), fl., *Richard Schomburgk* 1536 (type in Kew Herb.). Barima River, fl. March 1896, *Jenman* 6994. Mahdia Creek, Potaro River, 107 miles on Bartica-Potaro road, fr. Jan. 12th, 1943, *D. B. Fanshawe* in *Forest Dept.* no. 3749 : tough grey rope climbing over a low tree by creek ; leaves stiff, glaucous below, fls. yellow (not collected) ; fruit glaucous green with stiff wings.

The Schomburgk collection was first referred to *L. splendens* Juss. by Bentham (*loc. cit. supra*), who gave a description of the floral parts which had been unknown to Jussieu. At that date Bentham had evidently not himself seen the French Guiana material of Jussieu's species. Later, Niedenzu, in his final account of the family in the *Pflanzenreich*,

treated Schomburgk's and Jenman's specimens as a new var. *obovata* of *L. splendens*, with leaves larger, more obovate, abruptly cuspidate, and with longer petioles than those of the typical French Guiana plant, coll. Poiteau, which he named var. *oblanceolata*. At Kew the Schomburgk collection is represented by two good sheets from Bentham's herbarium, but the single sheet of *Jenman* 6994 consists only of two panicles, without leaves. Mr. Fanshawe's recent fruiting collection from the Bartica-Potaro road is in complete agreement with Schomburgk's specimens in the important foliage characters, while the remarkable samaras with their long lateral wings and broad dorsal crest establish this plant as a species wholly distinct from *Lophopterys splendens*. A specimen of the latter, collected by Poiteau and given to J. Gay in 1824, and later presented by Sir William Hooker in 1868, has been found among the *indeterminatae* at the end of the *Malpighiaceae* in the Kew Herbarium. It agrees perfectly with the descriptions and figures of Jussieu and Niedenzu, and is very possibly part of the type collection (the collector of which was never cited by Jussieu). While sharing with it the distinctive generic characters of the inflorescence and curious sepal-glands, as well as others derived from the branchlets and petioles and from the indumentum of the leaves, the British Guiana material differs specifically, not merely on account of its wholly different fruit, but also in characters of its leaves, which are stiffly papery rather than coriaceous, abruptly cuspidate at the rounded or even truncate apex, and bear 14–17 main lateral nerves on each side of the midrib, while the indumentum of the lower surface is silvery-grey and composed for the most part of extremely short close hairs. In *L. splendens* the relatively narrower, more oblanceolate, coriaceous leaves are attenuate-acuminate at the apex and have 11–14 main primary nerves on each side of the midrib, while the indumentum is more golden-sericeous with numerous long (exceeding 0.5 mm.) superposed "malpighian" hairs. The difference in size is no longer emphasised, since the leaves of Mr. Fanshawe's specimen are so much smaller than Schomburgk's, nor is a valid distinction likely to be found in the length of the petiole.

During the investigation of the fruit of Mr. Fanshawe's material it became obvious that it was congeneric with that of the new monotypic genus *Dolichopterys* which was described by Dr. A. Kostermans in 1935 and duly adopted in the treatment of *Malpighiaceae* in Pulle's *Fl. Surinam*, which appeared in 1936. Comparison of the description of *D. surinamensis* Kosterm. with the British Guiana specimens showed certain discrepancies in characters of both the leaves and fruit, and an over-hasty identification was reconsidered when fragments of the Surinam holotype (*Stahel* 223) were kindly presented to Kew by the authorities of the Utrecht Herbarium. The leaf of *D. surinamensis* proves to have all the characters of coriaceous texture, main venation, and golden-sericeous indumentum with many long superposed hairs, of *Lophopterys splendens*, differing in the emarginate apex and the rounded, very obscurely cordate base; while its fruiting samara, though very similar to those of Mr. Fanshawe's plant, differs conspicuously in the longer, looser, brownish-gold deciduous tomentum of the nut and, above all, in the much narrower lateral wings.

Dr. Kostermans distinguished his *Dolichopterys* from *Lophopterys* solely

on the grounds of the presence of long lateral wings on the samara of the former, admitting the relationship of the two genera in general habit, inflorescence and calyx-glands. The latter is indeed so obvious to the present writer, now that he has compared the fragments of *Dolichopterys* with the Poiteau sheet of *Lophopterys splendens* and with the British Guiana material described above, that it seems to him far more reasonable, on present evidence, to combine the three species in one genus, than to describe the British Guiana plant as a second species of *Dolichopterys*. On the evidence of the leaves, it might, indeed, be suspected that *D. surinamensis* and *L. splendens* were two forms of the same species, differing only in the presence or complete absence of long lateral wings on the samaras. This, however, is not seriously suggested, since the nut of the samara of *L. splendens* is apparently different from that of the Surinam plant, being ovate-ellipsoid in shape and more strongly ribbed, while the dorsal crest is only 5 mm. wide. It is much hoped, however, that further collections of these plants will be made, so that the validity of the apparent distinctions may be tested. Meanwhile the present writer proposes the following combination for *Dolichopterys surinamensis* :

Lophopterys surinamensis (Kosterm.) Sandwith, comb. nov.—*Dolichopterys surinamensis* Kosterm. in Rec. trav. bot. néerl. 32, 279–281, cum fig. (1935) ; in Pulle, Fl. Surinam, 2, 189–190 (1936).

This decision to unite *Dolichopterys* with *Lophopterys* raises afresh the question of the position of *Lophopterys* within the family. Jussieu placed it within his “*Notopterygieae seu Banisterieae*”, remarking that the affinity was doubtful, owing to the incompleteness of the evidence from the material, but that it was perhaps nearest to *Pterandra* (and *P. latifolia* Juss., now *Acanthera latifolia* (Juss.) Ndz., has suggestively similar branchlets, petioles, and leaves). Niedenzu placed it without hesitation in the *Banisterieae-Banisteriinae* next to *Heteropteris*, believing that it had evolved from the section *Pachypterys* of the latter genus (see Verz. Vorles. Ak. Braunsberg, W.-S. 1912–1913, 12 adnot. (1912) ; Engl., Bot. Jahrb. 50, Suppl. 171 (1914) ; Engler, Pflanzenreich, l.c. 385). Kostermans, although he placed *Dolichopterys* in the tribe *Banisterieae*, discussed the evolution of his genus and also of *Lophopterys* in relation to the genera *Triopteris* and *Tetrapteris* in the tribe *Hiraeae*, subtribe *Mascagninae*. The present writer feels inclined to agree with Kostermans rather than with Niedenzu, on a consideration of the fruits of the three species of *Lophopterys*. The characters of those of *L. euryptera* indicate clear affinities with the subgenus *Caulolepis* of *Tetrapteris*, and the samaras resemble fairly closely those of *T. calophylla*, if the reduced lower lateral wings of that species are discounted. Nevertheless, the facies of the leaves and inflorescence of *Lophopterys* is certainly very unlike that of species of *Tetrapteris*, and it would be most unwise to state positively that the progressive development of its samara was in this direction, from winged to wingless, rather than in the other direction, which would surely be a necessary supposition if we accepted Niedenzu’s belief that *Lophopterys* had arisen from the section *Pachypterys* of *Heteropteris* with its suggestive facies. As to the latter, the present writer doubts if Niedenzu could have maintained *Lophopterys* in the *Banisterieae*, if he had seen the fruits of *L. surinamensis* and *L. euryptera*, without upsetting the main distinction between the tribes *Banisterieae* and *Hiraeae*.

***Gray's Manual of Botany, Eighth (Centennial) Edition.**—The appearance of this volume, commemorating the centenary of Asa Gray's Manual, is an event of major importance for botanists in all North Temperate regions. Forty-two years ago, Prof. M. L. Fernald, in conjunction with Prof. B. L. Robinson, issued the revised seventh edition, of 926 pages. Since then he became Director of the Gray Herbarium, and his field and herbarium studies have made him an almost legendary (while still most lively) figure as the leading systematic botanist in Eastern North America. Now, for the centenary edition, he practically re-wrote the Manual and has nearly doubled its size. It has become, indeed, a new book, a magnificent modern flora in the highest class, incorporating all the hundreds of discoveries and taxonomic changes made by himself and other botanists in recent years, and put together with the infinite patience and enthusiasm of a master mind. The northern limit of the area dealt with has been extended to include the Gaspé Peninsula of Quebec, the Magdalen Islands and Newfoundland, regions with relict and endemic elements of extreme phytogeographic interest. Many of us will wish that a map of the area, even on a small scale, could be found somewhere in the book.

Some of the new features and outstanding merits of the work can be summarised. The book begins with a synopsis of the orders and families, followed by an original artificial analytical key to the families. Throughout the "descriptive flora", which forms the body of the work, there are entirely new keys to the genera and species, and also valuable separate keys to the varieties and forms of individual species. These ample keys, of the "indented dichotomous" kind, have obviously been prepared with exceptional care and knowledge, since so many characters and measurements are employed (one has only to look at the *Umbelliferae*, where there are two keys to the genera, a synoptic scientific key, and a more elaborate key based on superficial characters). The same is true of the generic and specific descriptions, while the habitats are more clearly defined than in previous editions of the Manual. Generic sections are usually indicated, both in the keys and in the text. Italics are freely used to distinguish salient characters in the descriptions of species. The number of text-figures is greatly increased, and there are even a very few full-page plates: many of the figures are by a new group of artists, and some of those representing complete plants or flowering branches, for instance in the critical genera *Solidago* and *Antennaria*, will be very helpful. Magnifications are omitted, but would have been useful for the text-figures of *Pteridophyta*, and particularly for the megaspores of species of *Isoetes*. Some botanical terms have been brought up to date (thus "cell" becomes "loculus"), and there is an excellent glossary at the end of the book. Many words, however, connected with ecology, genetics, plant distribution and kindred studies, which are fashionable in current phraseology, for instance "ecotone", "cline" and "apomict", will not be found here, while the life-forms and chromosome numbers of species are nowhere given. The volume concludes with separate indices of Latin and colloquial names.

Prof. Fernald makes a spirited defence of "capitalisation" in his preface, but his concessions to the decline of civilisation are reflected in the abandonment of Greek letters and in his translations of even the simplest

Latin epithets. His constant adviser in these matters, Prof. A. S. Pease, assured him that no understanding of the simplest Latin words can nowadays be assumed. As for the colloquial names, we are pleased to see his rejection of the strange rules for spelling compound words introduced by *Standardized Plant Names*. Here, as in all else, Prof. Fernald balanced independent judgment with common sense and a respect for tradition. One may wonder, perhaps, whether "Cursed Crowfoot", for *Ranunculus sceleratus*, is better than our own "Celery-leaved Crowfoot", in spite of the obvious danger of deriving the latter from the Latin epithet.

The help of recent revisions of genera is constantly acknowledged, with the relevant references, while original accounts of some critical groups are contributed by other botanists: that of *Crataegus* (103 species), for example, was prepared by E. J. Palmer, and the treatment of *Desmodium* was written by Dr. Bernice Schubert, to whom the author pays generous tribute as his right-hand man. The *Rubi* are kept down to 205 species, "temporary trends" being omitted, while only 24 Roses are recognized as sufficiently clear-cut for specific rank. The author, on the whole, takes a broad view of genera, e.g. *Draba*, *Lychnis*, *Pyrus*, *Convolvulus*, but he segregates *Cymbalaria*, *Kickxia* and *Chaenorhynchium* from *Linaria*. His survey of the vast literature of North Temperate floras has been astonishingly thorough. This was very necessary, since so many introduced plants from Europe have become established. Sifting, not lifting, the evidence, Prof. Fernald has considered and mastered their identity, characters, and nomenclature in a way which will make his book indispensable to European botanists. For example, *Cerastium tetrandrum*, *C. pumilum* and *C. brachypetalum* have all reached the area since the seventh edition, and they are excellently described and keyed; *Carduus acanthoides* and *C. crispus* are carefully distinguished; the varieties of *Cirsium arvense* are well described under their correct names; interesting characters are used for separating *Veronica agrestis* and *V. polita*; *Alchemilla microcarpa* is reported well-known in the area, while *A. arvensis* is recorded only from Nova Scotia. In fact, a separate paper is needed to discuss Prof. Fernald's views on the nomenclature and taxonomy of many common European species and varieties, especially as some of them conflict with those current in Britain.

Naturally, the treatment followed may sometimes be questioned. The most obvious instance is that of *Chenopodium*, which is largely derived from Standley's account of the genus in the *North American Flora* in 1916: P. Aellen's subsequent papers, extending over many years, seem to have been entirely neglected although many of his conclusions concern American species. In the same way, Dr. Philipson's work on *Agrostis*, and recent European papers on the nomenclature of microspecies of *Alchemilla*, have not been followed. Now and then Prof. Fernald lumps surprisingly: he unites *Lepidium neglectum* Thell. with *L. densiflorum* Schrad., *Amaranthus blitoides* S. Wats. with *A. graecizans* L., and *Polygonum nodosum* Pers. with the typical form of *P. lapathifolium* L. These examples represent individual opinions, but the inclusion of *Euphorbia virgata* Waldst. & Kit. in *E. esula* L. was no doubt a wise evasion of a long and tiresome issue. *Stachys palustris* L. is divided into two interesting subspecies with distinct geographic ranges, each with several varieties.

These are cited in the preface as a good illustration of two true subspecies but, curiously enough, they are left without names, both there and in the text. The use of *Veronica latifolia* L. for *V. teucrium* L. seems reactionary, if not actually wrong : the Linnean *V. latifolia*, as diagnosed in the *Species Plantarum*, and as emended by Scopoli, has for long been applied by European botanists since Kerner to *V. urticifolia* Jacq. ; it was Jacquin's interpretation and the evidence of specimens in the Linnean Herbarium which are identified with *V. teucrium* L. ssp. *pseudochamaedrys* (Jacq.) Nym. which caused many of the old authors to use the name *V. latifolia* L. for that plant.

The long stretches of the book are sometimes relieved by touches of humour. Cabbage is "suitable—some think—for a pot-herb" ; *Gonolobus baldwynianus* Sweet was "named by the English author, in his own sweet way, for William Baldwin" ; *Hieracium* is a "genus, especially in Europe, broken by technical specialists, with eyesight stimulated beyond that of the ancient hawks, into thousands of so-called species", etc. Enough has been said, I hope, to suggest that this book is the masterpiece of a great, creative, botanical scholar, a flora which will earn the gratitude of students and will arouse the envy and admiration of botanists, compilers and critics in all countries.

N. Y. SANDWITH.

*Gray's Manual of Botany, eighth (centennial) edition—Illustrated. A handbook of the flowering plants and ferns of the Central and Northeastern United States and adjacent Canada. Largely rewritten and expanded by Merritt Lyndon Fernald, with assistance of specialists in some groups. Pp. lxiv and 1632, ff. 1806, pl. iii. New York : American Book Company, 1950. Price U.S. \$9.50.

A Flora of the Anglo-Egyptian Sudan*—When the Sudan government in 1940 commissioned their Chief Economic Botanist, Dr. F. W. Andrews to produce a flora* they wanted a book which would, at a moderate price and in compact form, enable agriculturalists, foresters, science teachers and others, whether Africans or Europeans, to identify plants without recourse to a library or herbarium and without a previous study of botany. The present state of our knowledge does not allow this fully to be achieved, as many Sudan plants remain unknown, partly known or imperfectly understood, but the present attractive and workmanlike volume goes far towards the prescribed aim and should prove of great value to all concerned with plant life in the Sudan, and a stimulus to further work. It contains an outline of methods of plant description, hints on collecting, a key to families based on that of Hutchinson and a treatment of the Gymnosperms and Dicotyledon families up to the Tiliaceae in Hutchinson's sequence. Descriptions of families and keys to genera are accompanied by brief descriptions of all species. Keys to species are however only given where a genus has more than seven species in the Sudan and are not always dichotomous, for instance that to *Combretum* offers five alternatives at one point. There are 124 black and white illustrations which are drawn from other works and are of unequal value, a coloured vegetation map of the Sudan, and an index. It is hoped that the whole flora will be completed in another two volumes of approximately the same size and cost. It seems that the manuscript of the second volume is well on its way to completion and all students of African plants will hope that Dr. Andrews, who must have devoted an

immense amount of energy to the work in order to complete so much in addition to his other duties, will be able to finish the whole undertaking. Clearly a single botanist with so large a field to cover (this volume deals with 550 species belonging to 230 genera in 70 families) could not hope to undertake the revision of numerous African genera which would be necessary for a really authoritative flora, but the greatest care has been taken to make the nomenclature as accurate as possible. In this connection the help of botanists at the British Museum and Kew, and in particular of Mr. J. E. Dandy at the former institution is acknowledged.

The herbarium taxonomist for whom the book is not primarily designed, cannot, of course, reasonably complain of the omission of items such as literature references and most synonyms which are of little value to the field botanist ; he may however feel that, as his own work is essential to providing the field botanist with correct names, he should have been considered to the extent of giving an explanation, or an indication of where an explanation may be found, when changes in nomenclature are put forward. He will also probably feel that confusion as to exactly what plant Dr. Andrews has in mind is likely to arise because no specimens are cited. To have cited one or two specimens for each species would have taken little extra space and would save future workers much trouble.

The field worker, for whom the work is designed, will perhaps complain of the scantiness of the data given about distribution, frequency, time of flowering, etc. The remedy for this is however in his own hands, as present information is usually not sufficient for a proper account to be given of such matters, and it has evidently been felt better to omit data which are too incomplete to give an accurate picture. In some other respects he might reasonably feel that everything has not been done to meet his needs. No scales are given to the illustrations ; feet and inches are used instead of metric units, which will puzzle, not only foreigners and future generations, but the not inconsiderable number of people in the Sudan today who have been educated in Egypt ; the species are not numbered to facilitate reference from the key to the description. Most serious is the absence of keys in genera represented by seven or fewer species, together with the fact that the descriptions have not been sufficiently checked to ensure that they really differentiate between the species. For instance no one could distinguish *Kalanchoe petitiiana* from *K. glaucescens* by the descriptions on p. 76. One appreciates the zeal on the part of those responsible for this book which has led to its early appearance but nevertheless one hopes that in producing the remaining volumes a little more time may be allowed, in order to make the work really first class of its kind.

J. B. GILLETT.

*The Flowering Plants of the Anglo-Egyptian Sudan Vol. 1. By F. W. Andrews. Bunche and Co. Ltd., Arbroath, Scotland. 1950. Price 21/-.

Actinomyces*—The Actinomycetes are a group of micro-organisms morphologically somewhat intermediate between bacteria and fungi. Formerly neglected, apart from their somewhat insignificant role as plant and animal parasites, they have recently aroused world-wide interest as possible sources of antibiotic substances. In Caracas I was recently surprised to find a private laboratory devoted to the study of hundreds

of Actinomycete cultures isolated from Venezuelan soils in the hope of discovering new sources of antibiotics of value in medicine. Prof. Waksman, himself a distinguished American student of soil microbiology, is therefore sure of a welcome for his mature and well-digested summary of current knowledge of these organisms, much of which has emanated from his laboratory. The scope of his work is adequately indicated in its title. It is not primarily a taxonomic manual and for determination of species the reader is still dependant on such works as Bergey's Manual of Determinative Bacteriology. Nevertheless the author shows a welcome appreciation of the importance of a sound taxonomic basis for his work and has evidently devoted much thought to the subject, to which the first two chapters of his book are devoted. Within the order *Actinomycetales* he recognises three families, *Mycobacteriaceae* with one genus, *Actinomycetaceae* and *Streptomycetaceae* with two each. The latter four genera *Actinomyces* Harz, *Nocardia* Trevisan, *Streptomyces* Waksman and Henrici and *Micromonospora* Orskov, most of them with extensive and involved synonymy, are described in detail, as are seven species of economic importance. All but one of the latter, including the familiar *Actinomyces scabies* Thaxter, are referred to *Streptomyces*. Emphasis is laid throughout on morphological characters, which are regarded as more stable than pigmentation and chemical properties. This conclusion accords with that of workers on critical mould genera such as *Penicillium* but one wonders if it has any implications for bacteriologists or even for lichenologists who appear to place implicit confidence in delimitation of species by colour reactions, based on the presence of little-known organic compounds in the thallus. If Actinomycete nomenclature is governed by the International Botanical Rules it would seem desirable to propose *Micromonospora* Orskov 1923 for conservation against *Thermoactinomyces* Tsiklinsky 1899 as, according to the summary on p. 98, it would seem difficult to avoid typifying the latter genus by *T. vulgaris* Tsiklinsky, which is stated to be a *Micromonospora*.

Ecologists will be interested to note that some Actinomycetes are characteristic of peculiar environments, thus some species of *Micromonospora* seem to flourish mainly in lacustrine muds, others with some species of *Streptomyces* are thermophilic and flourish in high temperature composts at 60° C. and over. Some of the latter are not obligate but facultative thermophiles which grow in artificial culture at lower temperatures but there is evidence that many thermophilic Actinomycetes remain unknown because they grow only in specialised environments which have not yet been reproduced in pure culture.

Unfortunately Professor Waksman's text is marred by its illustrations. Rarely is there any indication of the magnification of the microscopic preparations figured. This reviewer, at least, finds it difficult to see mitosis in the electron microscope photographs reproduced as Fig. 13. Far worse is the unsightly pen and ink scribble, it cannot fairly be called a sketch, which defaces the page following p. 230. These, however, are perhaps lapses by the editor or publisher and it is to be hoped they will not prejudice students against an otherwise admirable work.

R. W. G. DENNIS.

*The Actinomycetes. Their nature, occurrence, activities and importance. By Selman A. Waksman. Waltham, Mass : Chronica Botanica Co. London, W.C.2 : Wm. Dawson & Sons, Ltd., 1950. Pp. xviii + 230. Price \$5.00

PALISOT DE BEAUVOIS'S FLORE D'OWARE ET DE BENIN, EN AFRIQUE.

H. S. MARSHALL.

During the war through the courtesy of Messrs. Thomas Thorp, 149, High Street, Guildford, I had an opportunity of examining a copy of A. M. F. J. Palisot de Beauvois' Flore d'Oware et de Benin, en Afrique, bound in two volumes, with the original wrappers. Although several papers have been written on this important work, none of the authors apparently had seen a copy complete with all the original wrappers. It has therefore been thought worth while to place on record the contents of each part and the date of publication as printed on the wrappers. These are as follows :—

Premiere livraison.

I.	Favolus hirtus.	Guépier hérissé.
II.	Acrosticum stemmaria.	Acrostic hétérophyllé.
III.	Culcasia scandens.	Culcasie grimpante.
IV.	Poa mucronata.	Paturin mucroné.
V.	Ompholocarpum procerum.	} Omphalocarpe géant.
VI.	Idem. Fruit.	

De l'Imprimerie de Fain Jeune et Compagnie.

A Paris.

Chez l'Auteur, rue du Parc, no. 511, au Marais. . . .

An XIII—1805.

Seconde livraison.

VII.	Stachygynandrum scandens.	Stachygynandre grimpant.
VIII.	{ Killigia bulbosa	Killingie bulbeuse.
	{ Microporus perula.	Micropore poche.
IX.	Calamus secundiflorus	} Rotang à fleurs secondaires.
X.	Idem. Feuille.	
XI.	Myrianthus arboreus	} Myrianthe en arbre.
XII.	Idem. fruit.	

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An XIII—1805.

Troisieme livraison.

XIII.	{ Ulva bulbosa.	Ulve bulbeuse.
	{ Carpolepidum	Carpolépide dichotome.
	{ dichotomum.	
XIV.	Manisuris polystachya.	Manisure à plusieurs épis.
XV.	Commelina ambigua.	Commeline douteuse.
XVI.	Xilopia undulata.	Xilopie ondulée.
XVII.	Ventenatia glauca.	Ventenate glauque.
XVIII.	Hedisarum lasiocarpum.	Sainfoin lasiocarpe.

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A Paris.

Chez l'Auteur, rue du Parc, no. 511, au Marais. . . .

An XIII—1805.

Quatrieme livraison.

XIX.	Aspidium subquaquefidum.	Aspide presque quinquéfide.
XX.	Cyperus distans.	Souchets à fleurs distantes.
XXI.	{ Pandanus candelabrum.	Pandang lustre.
XXII.		
XXIII.	Spermacoce serrulata.	Spermacocée serrulée.
XXIV.	Sterculia acuminata.	Sterculie acuminée.

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Chez l'Auteur, rue du Parc, no. 511, au Marais. . . .

An XIII.—1805.

Cinquieme livraison.

XXV.	Daedales amanitoides.	Dedale amanitoide.
XXVI.	Ruellia elongata.	Crustolle elongée.
XXVII.	Spathodea campanulata.	Spathodée campanulée.
XXVIII.	Fruit de la Spathodée.	
XXIX.	Spathodea laevis.	Spathodée lisse.
XXX.	Grewia carpinifolia.	Grewie à feuille de charme.

De l'Imprimerie de Fain et Compagnie

A Paris.

Chez l'Auteur, rue de Turenne, no. 58 au Marais. . . .

An XIV—1805.

Sixieme livraison.

XXXI.	Killingia globosa.	Killingie globuleuse.
XXXII.	Clerodendron volubile	Clérodendron volubile.
XXXIII.	Hoslundia oppositifolia.	Hoslundie opposée.
XXXIV.	Landolphia owariensis.	Landolphie d'Oware.
XXXV.	Quisqualis ebracteata.	Quisquale sans bractée.
XXXVI.	Croton lobatum.	Croton lobé.

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An XIV.—1805.

Septieme livraison.

XXXVII.	{ Bryum albidum.	Bry blanchâtre.
		Pteris cornue.

XXXVIII.	<i>Commelina aequinoctialis.</i>	Commeline équinoxiale.
XXXIX.	<i>Porana acuminata.</i>	Porane acuminée.
XL.	<i>Sterculia heterophylla.</i>	Sterculie hétérophylle.
XLI.	<i>Melastoma decumbens.</i>	Mélastome couchée.
XLII.	<i>Anthothona macrophylla.</i>	Anthothona à grandes feuilles.

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M. DCCC. VI.

Huitieme livraison.

XLIII.	{ <i>Microporus concinnus</i>	Micropore élégant.
	{ <i>Favolus tenuiculus.</i>	Guêpier mince.
XLIV.	{ <i>Raphia vinifera</i> , fig. 1.	Raphie vinifère, fig. 1.
	{ <i>Raphia pedunculata</i> , fig. 2.	Raphie pédonculée, fig. 2.
XLV.	<i>Spadix.</i>	Spadix.
XLVI.	<i>Fructus.</i>	Fruit.
XLVII.	<i>Avicennia africana.</i>	Avicenne d'Afrique.
XLVIII.	<i>Struchium africanum.</i>	Struchium d'Afrique.

De l'Imprimerie de Fain et Compagnie.

A Paris.

Chez l'Auteur, rue de Turenne, no. 58 au Marais. . . .

MDCCC. VI.

Neuvieme livraison.

XLIX.	<i>Panicum setigerum.</i>	Panis sétigère.
L.	<i>Justicia elegans.</i>	Carmentine élégante.
LI.	<i>Pavetta owariensis.</i>	Pavata d'Oware.
LII.	<i>Lasianthera africana.</i>	Lasianthère d'Afrique.
LIII.	<i>Aeschinomene sensitiva.</i>	Aeschinomène sensitive.
LIV.	<i>Tragia pedunculata.</i>	Tragie pédonculée.

De l'Imprimerie de Fain et Compagnie.

A Paris.

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M. DCCC. VI.

Dixieme livraison.

LV.	<i>Killingia umbellata.</i>	Killingie en ombelle.
LVI.	<i>Asclepias scandens.</i>	Asclépiade grimpante.
LVII.	<i>Tristemma hirtum.</i>	Tristemme hérissée.
LVIII.	<i>Ormocarpum verrucosum.</i>	Ormocarpe verruqueuse.
LIX.	<i>Cnestis obliqua.</i>	Cneste oblique.
LX.	<i>Cnestis pinnata.</i>	Cneste pinnée.

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M. DCCC. VI.

Tome second.

Onzieme livraison.

LXI.	<i>Asplenium emarginatum.</i>	Doradille émarginée.
LXII.	<i>Clerodendrum scandens.</i>	Clérodendron grimpant.
LXIII.	<i>Loranthus sessilifolius.</i>	Loranthé à feuil. sessiles.
LXIV.	— lanceolatus.	— à feuilles lancéolées.
LXV.	<i>Ceranthra dentata.</i>	Céranthère dentée.
LXVI.	— subintegrifolia.	— à feuilles presque entières.

De l'Imprimerie de Fain et Compagnie.

A Paris.

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M. DCCC. VIII.

Tome second.

Douzieme livraison.

LXVII.	<i>Hypoclytrum nemorum.</i>	Hypoclytre de forêts.
LXVIII.	{ <i>Oplismenus africanus.</i>	Oplismène d'Afrique.
	{ <i>Pontederia natans.</i>	Pontédérie nageante.
LXIX.	<i>Wedelia africana.</i>	Wédélie d'Afrique.
LXX.	<i>Eugenia owariensis.</i>	Eugénie d'Oware.
LXXI.	<i>Gomphia glaberrima.</i>	Gomphie très-glabre.
LXXII.	<i>Gomphia reticulata.</i>	Gomphie réticulée.

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M. DCCC. X.

Tome second.

Treizieme livraison.

LXXIII.	<i>Remirea maritima.</i>	Rémirée maritime.
LXXIV.	<i>Cryphiospermum repens.</i>	Cryphiosperme rampant.
LXXV.	<i>Stipularia africana.</i>	Stipulaire d'Afrique.
LXXVI.	<i>Robinia violacea.</i>	Robinier violet.
LXXVII.	<i>Stylosanthes erecta.</i>	Stylosanthe droite.
LXXVIII.	<i>Napoleona imperialis.</i>	Napoléone impériale.

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M. DCCC. X.

Tome second.

Quatorzieme livraison.

LXXIX.	Asplenium sinuatum.	Doradille sinuée.
LXXX.	(fig. 1) Sporobolus pyramidalis.	Sporobole pyramidale.
	(fig. 2) Agrostis tropica.	Agrostis des tropiques.
LXXXI.	(fig. 1) Isolepis obtusifolius.	Isolépïs à feuilles obtuses.
	(fig. 2) Rhynchospora aurea.	Rhynchospore commune.
LXXXII.	Ipomea owariensis.	Quamoclit d'Oware.
LXXXIII.	(fig. 1) Bombax buonopozensis.	Bombax de buonopozo.
	(fig. 2) Uvaria chamae.	Uvaire de chama.
LXXXIV.	Indigofera endecaphylla.	Indigotier à onze feuilles.

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M. DCCC. XVI.

Tome second.

Quinzieme livraison.

LXXXV.	(fig. 1) Paspalum kora.	Paspale kora.
	(fig. 2) — longiflorum.	— à longues fleurs.
LXXXVI.	(fig. 1) Abilgaardia barbata.	Abilgaardie barbue.
	(fig. 2) Pycreus polystachyos.	Pycré à plusieurs épis.
LXXXVII.	Commelina beniniensis.	Commeline du Benin.
LXXXVIII.	Nymphaea lotus.	Nénufar lotus.
LXXXIX.	Ipomaea involucrata.	Quamoclit involuquée.
XC.	Inga biglobosa.	Inga biglobuleuse.

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M. DCCC. XVI.

Tome second.

Seizieme livraison.

XCI.	(fig. 1) Aspidium ramosum.	Aspide rameuse.
	(fig. 2) Jungermannia prostrata.	Jungermanne couchée.
	(fig. 3) Leskea ? integra.	Leskée ? entière.
	(fig. 4) Hypnum ? Aspidii.	Hypne ? de l'Aspide.
XCII.	(fig. 1) Paspalum vaginatum.	Paspale vaginé.
	(fig. 2) — ciliatum.	— cilié.
XCIII.	(fig. 1) Aneilema africana.	Anéilème d'Afrique.
	(fig. 2) Elytraria marginata.	Elytraire marginée.
XCIV.	Ocymum heptodon.	Basilie à sept dents.
XCV.	(fig. 1) — monostachyum.	— à un seul épi.
	(fig. 2) Platostoma africanum.	Platostome d'Afrique.

XCVI. *Heliotropium anisophyllum*. Heliotrope anisophylle.

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M. DCCC. XVIII.

Tome second.

Dix-septieme livraison.

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| XCVII. | (fig. 1) <i>Cyperus crassipes</i> . | Souchet à chaume épais. |
| | (fig. 2) — <i>Niloticus</i> . | — du Nil. |
| XCVIII. | <i>Philoxerus vermicularis</i> . | Philoxère vermiculaire. |
| CIX. [sic] | (fig. 1) <i>Alternanthera</i> | Alternanthere ficoïde. |
| | ficoïdes. | |
| | (fig. 2) — <i>varietas</i> . | — variété. |
| C. | (fig. 1) <i>Hypoestes rosea</i> . | Hypoëste rose. |
| | (fig. 2) <i>Brillantaisia</i> | Brillantaisie d'Oware. |
| | <i>Owariensis</i> . | |
| CI. | <i>Ipomaea ennealoba</i> . | Quamoclit à neuf globes. |
| CII. | <i>Grewia megalocarpa</i> . | Grewie mégallocarpe. |

De l'Imprimerie de Fain.

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M. DCCC. XVIII.

Tome second.

Dix-huitieme livraison.

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| CIII. | <i>Cannamelle spontanée</i> . | <i>Saccharum spontaneum</i> . |
| CIV. | (fig. 1) <i>Aneilème ovale-oblongue</i> . | <i>Aneilema ovato-oblonga</i> . |
| | (fig. 2) <i>Alternanthere des rivages</i> . | <i>Alternanthera littoralis</i> . |
| CV. | <i>Quamoclit ériosperme</i> . | <i>Ipomae eriosperma</i> . |
| CVI. | — <i>vésiculeuse</i> . | — <i>vesiculosa</i> . |
| CVII. | (fig. 1) <i>Allophyle d'Afrique</i> . | <i>Allophyllus africanus</i> . |
| | (fig. 2) <i>Erinée de l'Allophyle</i> . | <i>Erineum allophylli</i> . |
| CVIII. | <i>Grewie pubescente</i> . | <i>Grewia pubescens</i> . |

De l'Imprimerie de Fain.

A Paris.

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M. DCCC. XIX.

Tome second.

Dix-neuvieme livraison.

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| CIX. | (fig. 1) <i>Guêpier glabre</i> . | <i>Favolus glaber</i> . |
| | (fig. 2) <i>Hypne agréable</i> . | <i>Hypnum gratum</i> . |
| | (fig. 3) <i>Trichomane lacinié</i> . | <i>Trichomanes erosum</i> . |

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| CX. | (fig. 1) Panis à feuilles ovales. | <i>Panicum ovalifolium</i> . |
| | (fig. 2) Setaire à longue soie. | <i>Setaria longiseta</i> . |
| CXI. | Phlomide ? d'Afrique. | <i>Phlomis ? africana</i> . |
| CXII. | Herpeste crènelée. | <i>Herpestris crenata</i> . |
| CXIII. | Hylacium d'Oware. | <i>Hylacium owariensis</i> . |
| CXIV. | Dolique échancrée. | <i>Dolichos emarginata</i> . |

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M. DCCC. XIX.

Tome second.

Vingtième livraison.

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| CXV. | <i>Scoparia dulcis</i> . | Herbe à balais douce. |
| CXVI. | <i>Sida africana</i> . | Abutilon d'Afrique. |
| CXVII. | <i>Hibiscus owariensis</i> . | Ketmie d'Oware. |
| CXVIII. | (fig. 1) <i>Combretum</i>
<i>racemosum</i> . | Chigomier à grappes. |
| | (fig. 2) — <i>macrocarpum</i> . | — à grand fruit. |
| CXIX. | <i>Indigofera hirsuta</i> . | Indigotier hérissé. |
| CXX. | <i>Kolbia elegans</i> . | Kolbie élégante. |

De l'Imprimerie de Fain.

A Paris.

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M. DCCC. XX.

The title page to the first volume bears the date "An XII—1804," yet the first wrapper is dated "An XIII—1805." This seems to indicate that the title-page was pre-printed. A review of the first livr. appeared in Schrader's *Neues Journal für die Botanik*, vol. 1, pt. 2, p. 61 (1806) where the date is given as 1805.

The title page to the second volume bears the date "M.DCCC.VII" but the first wrapper in this volume (livraison XI) is dated "M.DCCC.VIII," which again seems to indicate that the title page was printed before the appearance of the first livraison of Tome 2.

It is interesting to note that on the wrapper of "Quatorzième livraison" instead of the author's name being given as "A.M.F.J. Palisot de Beauvois" as on the previous parts, it now reads as "A.M.F.J. Palisot, Baron de Beauvois," and changes again on the wrapper of the "Seizième livraison" to "M. le Baron de Beauvois."

In conclusion, attention is drawn to the faulty colouring of some of the plates in this work, and certainly the colours of the flowers depicted should not be accepted without additional evidence as confirmation. Mr. Brenan (a member of the Kew staff) will refer to this matter in a forthcoming paper on African Commelinaceae.

Clavaria and other genera*—Mycologists working in the tropics, away from the resources of large botanical libraries, have little to assist them in naming their common fungi, and are still largely dependent on the work of taxonomists attached to the larger herbaria of the world. They will therefore welcome the appearance of a monograph dealing in comprehensive fashion with the world species of at least one group of morphologically similar fungi, the Clavarioid Basidiomycetes. Mr. Corner does not use the term Clavariaceae, for he considers these fungi to be polyphyletic, and therefore does not define any systematic unit above the genus. Groups of genera thought to be allied are placed together as "series". Monographs of this kind are badly needed for all groups of fungi, and the more intensive study of tropical species will undoubtedly lead eventually to the better understanding of relationships. To these Clavarioid forms Mr. Corner has applied the ideas as to the importance of hyphal construction which he has elaborated in earlier papers on members of the Polyporaceae. "The Clavarioid fruit-body is not, in itself, an indication of affinity. The primary index is similarity of hyphal construction". On this basis he has distinguished 27 genera, of which nine are new. *Pterula* and its allies are segregated as the "Pteruloid series", with dimitic structure, from the remaining genera, which are all monomitic. These others are again divided into groups according to the presence or absence of inflation in the hyphae, of clamp connections, and the existence of dichophyses. The genus *Lachnocladium* Lév., which has in the past been a dumping-ground for all sorts of branched forms which in the dried state appear to be tough, is now restricted to species with monomitic, uninflated hyphae without clamps, with pale yellowish-brown walls darkening in dilute alkali (that is, like the section *Hymenochaetoideae* of Donk, the "xanthochroic series" of the present work), and with abundant gloecystidia and dichophyses. Other characters used in the definition of genera are the presence of secondary septation in hyphae and basidia, the thickening of the hymenium by continued growth, as well as the more familiar characters of spore-colour, presence of cystidia, etc. Much is made of the location of pigment, and many new terms are introduced to denote whether pigment is present or absent, or if present whether located in oil drops, in the cytoplasm, or in the walls of spores or of hyphae. Complications of terminology such as this add to the difficulty of perusal and tend to make the first part of the book, in which the author develops his theories as to the delimitation of genera, rather heavy going. Fortunately a glossary is provided at the end of the work. The bulk of the book and consequently its price, is further increased because the author indulges in much phylogenetic speculation, which in the absence of any fossil record must be largely a matter of the imagination. For Mr. Corner all simple forms have been derived by reduction from more complicated bodies, but one fails to gather that there is any real evidence for this view.

After all this preliminary discussion has been digested, the kernel of the matter is reached on p. 172 with first a suggested "natural classification", followed by artificial keys to the Clavarioid fungi with white and with coloured spores. The genera are then dealt with in detail, and keys for species provided, followed by descriptions of the species arranged in alphabetical order. Of 540 species dealt with 45 are described as new,

and there are also numerous new varieties, all unfortunately with no data as to type specimens and where they are to be found.

There are very few misprints : fig. 95 cited at the bottom of p. 39 should be fig. 91, and on p. 91 "*Lachnocladium zonale*" is obviously a slip for *L. zonatum*. The author's style is sometimes a little obscure. For instance on p. 193 he apparently means to say that *Merisma tuberosum* Grev. was not recorded under that name in Great Britain after its first description, but the first impression on reading the sentence is that Scotland is not included in Great Britain !

Nevertheless, this book is a record of an enormous amount of work, and brings forward fresh facts and fresh interpretations which are deserving of serious consideration. The beautiful black-and-white figures which are characteristic of all Mr. Corner's work assist much in the understanding of his arguments as to structure. The sixteen coloured plates are useful as giving a quick indication of colour and habit, though the delicacy of some colours, such as the apricot tinge of *Clavulinopsis luteoalba* (Rea) Corner, seems to have suffered in reproduction. It is unfortunate that the book could not have been produced at a lower price, for it is a volume that the serious mycologist will want to have continually beside him for reference, not merely for occasional consultation in a library.

E.M.W.

* A Monograph of *Clavaria* and Allied Genera, by E. J. H. Corner. Annals of Botany Memoirs, No. 1. Oxford University Press (London : Geoffrey Cumberlege), 1950. Pp. xv and 740, 16 coloured plates, 298 text-figures, price £5. 5. 0.

Mr. J. H. Holland.

It is with regret that the death is recorded, on the 6th October, 1950, of John Henry Holland, in his 81st year, after a short illness. His connection with Kew extended well over half a century for he came to Kew (from Cheshire) as a young student gardener in 1894 and joined the staff (Museum Department) in 1901, after having spent five years in Nigeria at the Botanic Garden or 'Station' at Old Calabar, a post he was obliged to relinquish through ill health. On returning from Nigeria his intentions were to study for a degree in natural science at Aberystwyth but he gave up the idea on being offered a post at Kew. He retired officially from Kew in 1934 on reaching the age limit but continued with his botanical activities and interests and was a frequent visitor to Kew, to consult literature or specimens, almost up to the time of his death. He possessed a wide knowledge of economic botany and rendered valuable service to the Establishment for over thirty years. He published a good deal during this period, his best known work being probably his *Useful Plants of Nigeria* which appeared in four parts as Additional Series to the Kew Bulletin. Holland possessed great ability as a compiler and his flare for bringing to light the smallest details of any subject in which he was interested or which he was investigating, regardless of the effort or trouble involved, was well known to all his colleagues.

F.N.H.

Cultivated Orchids* It is now about forty years since a book of any importance on the cultivation of orchids was published in this country, so the present work will supply a long felt need. There has, moreover, been such great progress in the raising and development of hybrids since Mr. Curtis' own *Orchids for Everyone* appeared in 1910 that any modern work has perforce to give them an important place in its pages. It is therefore a matter for congratulation that Mr. Curtis still puts the naturally occurring species first, for, after all, they are the origin and foundation of even the most beautiful of hybrids.

After several introductory chapters which deal with, among other subjects, the history of importation and cultivation, geographical distribution, classification, types of growth and pollination and fertilisation, there follows an important section on the cultivation of orchids. This is given in simple and straightforward language and is packed with practical hints accumulated by Mr. Curtis during his long experience of growing and studying orchids.

The main body of the book is taken up by an enumeration, with descriptions and references to illustrations, of all the more important cultivated genera and species, accompanied by selections of the most attractive and worth-while hybrids. A subsidiary list of orchids of botanical interest follows but, as Mr. Curtis himself admits, it is often a matter of personal choice as to which group some genera should properly be referred. A list of intergeneric hybrids, and a monthly calendar of operations in the orchid houses complete the text proper. There is, however, a very extensive bibliography of books and papers on orchids which will be invaluable to any reader who wishes to pursue the subject further. The book is illustrated with nearly eighty delightful portraits of orchids, both species and hybrids, in colour and monochrome.

With so much to be commended it seems churlish to find fault, but nevertheless the writer cannot help wishing that in his treatment of the genera and species Mr. Curtis had adopted a more definitely modern botanical standpoint, both as regards nomenclature and classification. After all it is the writers of such books as this who should be the leaders in trying to keep horticulturalists in touch with the latest generally accepted results of botanical investigations and research. It is many years since the correct generic names for *Selenipedium*, *Arachnanthe*, *Trichosma* and *Platyclinis* were demonstrated, while Mr. Curtis' treatment of *Zygopetalum* and *Angraecum*, to cite two examples, is rather old-fashioned botanically, to put it mildly. May the writer point out that the same species will be found in the genera *Ancistrochilus* (p. 186) and *Pachystoma* (p. 202) ; the former is the correct place. There is also an unfortunate slip on p. 32, where the genus *Arachnis* (the correct name for *Arachnanthe*) is spelt *Arachis*, which happens to be the name of the much publicised ground-nut !

Nevertheless, we must congratulate Mr. Curtis on the production of a very attractive and useful book which will be a valuable addition to any botanical library. It is a pity, however, that present production costs make the price beyond some people's means.

V. S. SUMMERHAYES.

*Orchids : Their Description and Cultivation : by Charles H. Curtis, pp. 274, 30 col. and 48 uncol. ill. London : Putnam, 1950. Price £4. 4. 0.

NOTES ON FIVE WEST AFRICAN SPECIES OF *CISSUS* LINN.

F. WHITE.

(Imperial Forestry Institute, Oxford).

SPECIES MENTIONED IN THIS PAPER.

Cissus caesia Afz.*C. rufescens* Guill. et Perr.*C. pseudocaesia* Gilg et Brandt.*C. doeringii* Gilg et Brandt.*C. corylifolia* (Baker) Planch.

INTRODUCTION.

Cissus caesia was described by Afzelius in *Remedia Guineensis* in 1815, and the closely related *C. rufescens* by Guillemain and Perrottet in *Florae Senegambiae Tentamen* in 1832. The latter refer to *C. caesia* in their description, but mention only one reliable character—the glaucous stems—in which it differs from their new species. Since then the two species have been repeatedly confused, sometimes being regarded as conspecific, and sometimes as being distinct. Thus : Baker in the *Flora of Tropical Africa* 1 (1868) considered *C. rufescens* to be identical with *C. caesia* after examining the type-material of both, which was present at the British Museum. Planchon in DC., *Monographiae Phanerogamarum* 5 (1887) keeps them apart, but all of the specimens of *C. caesia* which he cites as having personally examined are probably slightly atypical plants of *C. rufescens*. This must account for his observation on the relationships of the two species, that “Il serait pourtant bon de voir sur des matériaux complets si ces différences sont suffisantes pour justifier la séparation spécifique de ces plantes, qui reste pour moi très douteuse”. Gilg and Brandt in *Vitaceae Africanæ* in *Engl., Bot. Jahrb.* 46 (1912) also maintain both species, after examining the type of *C. caesia* and a wide range of material of *C. rufescens*, which did not apparently include the type. In their *Flora of West Tropical Africa* 1 (1928) Hutchinson and Dalziel once more combine the two species. The confusion can partly be attributed to the undue stress attached to morphological characters such as : leaf shape and size, relative length of petiole to lamina, tendril development etc., which are very plastic in the genus. Two new species : *C. pseudocaesia* and *C. doeringii*, were described by Gilg and Brandt, op. cit., in 1912. The former appears to have been based on hybrid material, with *C. caesia* and *C. rufescens* as the parents. The latter is distinct from *C. caesia*, which it closely resembles, but is only represented by a few specimens in European herbaria. It has been confused with *C. corylifolia* by Chevalier, but is very distinct.

During the course of this work, it was found that there are striking differences between *C. caesia*, *C. rufescens* and *C. corylifolia* in the nature and distribution of the indumentum covering the lower surface of the leaves, and that these differences are correlated with others affecting other parts of the plant. The indumentum of *C. pseudocaesia* is intermediate between that of *C. caesia* and *C. rufescens*, but most closely resembles the latter. That of *C. doeringii* differs slightly from *C. caesia*, but the plant differs from that species in other important respects (see Plates 1).

I have examined all of the specimens cited, with the exception of two syntypes of *C. doeringii* which were in the Berlin herbarium.

DESCRIPTION OF THE FIVE SPECIES AND CITATION OF SPECIMENS.

Cissus caesia ("caesius"), Afz. in Remed. Guin. **55** (1815); Planchon in DC., Monogr. Phan. **5**, 485 (1887); Gilg et Brandt in Engl., Bot. Jahrb. **46**, 474 (1912); Hutch. et Dalz., Fl. W. Trop. Afr. **1**, 473, 476 (1928), *pro parte*.

Vitis caesia (Afz.) Sabine in Trans. Hort. Soc. **5**, 447 (1824); Baker in Oliv., Fl. Trop. Afr. **1**, 396 (1868), *pro parte*.

VERNACULAR NAMES. Authorities: A.=Afzelius, L-P.=C. E. Lane-Poole, T.=N. W. Thomas.

Bulloms (probably a sub-tribe of the Mendi): *Tambulla* (A.). Limba: *Popowu* (T.). Mendi: *Danyowohgambuli* (L-P), *Gwamyaga bola* (T.). Susu: *Lackase* (A.), *Laxase* (T.). Timne: *Etune* (T.).

Habit: a climbing shrub with well developed tendrils, usually not coiled in the apical regions of the plant, which alone are usually collected. *Branchlets* glabrous, even when very young; occasionally there are a few scattered short hairs; covered with a glaucous, waxy bloom, which may disappear from older stems. *Leaf shape and size* very variable, petiole varies from 1-4 cm. in length, usually 1.5-2 cm.; length of lamina 7-9 cm., occasionally up to 12 cm.; shape cordate to reniform-cordate, may also be orbicular, polygonal-orbicular or sagittate-cordate (there is a tendency for the leaves to have 3-5 lobes or cusps); margin with setaceous teeth 1-1.5 mm. long set at right-angles. *Upper leaf surface*: a few wax particles and hairs are scattered along the nerves. There are also a few shining, black, medifixed structures scattered over the surface (see Plate 1). *Lower leaf surface*: in the mature leaf the inter-venal areas are completely obscured by a dense indumentum of very fine, short, grey hairs, interspersed among which are a few black medifixed structures. On the nerves and veins are fewer, stronger curly hairs, those on the nerves being longer than those on the veins. The young leaves differ in that the indumentum on the lamina is less dense, and the leaf-surface can be seen through it. *Inflorescence and flowers*: no striking differences were found either in floral structure or in arrangement in the five species and their details are omitted here.

SIERRA LEONE. No precise locality, 1792, *Afzelius s.n.*, syntype (Herb. Kew ex Uppsala, examined by Gilg and Brandt), young and mature leaves and flowers, and young fruit. Without locality or date *Afzelius s.n.* syntype (Herb. Brussels ex Berlin), young and mature leaves and flowers. Railway District: near Pujahun, 12 Apr. 1939, *Deighton* 3690 (Herb. Kew.), leaves and flowers, "climber in grassfield". Without locality or date, *Don. s.n.* (Herb. Mus. Brit.). Kennedy Ridge near Freetown, 6 Apr. 1882, *H. H. Johnston s.n.* (Herb. Mus. Brit.), young and old leaves, and young flowers, "jungle about 270 m. above sea-level, a climbing shrub, stem, branches and lower part of tendrils pale green". Kennedy Ridge near Freetown, alt. 270 m., 6th Apr. 1882, *H. H. Johnston* 6. (Herb. Kew.). Waterloo near Freetown, 28 June 1914, *C. E. Lane-Poole* 306 (Herb. Kew.) leaves and flowers. Without locality or date, *Morson s.n.* (Herb. Kew.), young leaves and flowers. Without locality or date, *Scott Elliot s.n.* (Herb. Kew.), one leaf and one inflorescence. Laminaiya alt. 115 m., 25 Apr. 1914, *Thomas* 149 (Herb. Kew.), mature leaves and flowers. Mabum, alt. 95 m., 17 Aug. 1914, *Thomas* 1652 (Herb. Kew.), mature leaves and fruit. No precise locality, 1915,

Thomas 8700 (Herb. Kew.), young and mature leaves and flowers "Reg. littoralis interior. In sylvis editicribus supra Freetown (Sugar Loaf Mtns.", Sept. 1853, *Welwitsch* 1499 (Herb. Mus. Brit.), fragment including mature fruits.

NIGERIA : Nupe, no date, *Barter* 563 (Herb. Kew.), leaves and fruit.

Planchon, *op. cit.*, 486, cites four numbers of *Lécard* : 38, 162, 163, and 178, which were collected from the "schistes ardoisiers" of Kalez in Senegambia, as belonging to this species. He did not, apparently, examine any authentic material of *C. caesia*, so that their determination was probably based on the original diagnosis of Afzelius. Gilg and Brandt, *l.c.*, considered them to be poor specimens of their new species *C. pseudocaesia*. The large size of their leaves, from 11.5 to 14.5 cm. in diameter, suggests that they were collected from an unusual habitat, but even so their similarity to *C. rufescens* is considerable (see p. 57). They certainly do not belong to *C. caesia*. Most of the records of *C. caesia* from outside Sierra Leone are probably erroneous. *Chevalier* 5525 from the Chari region, and 16459 and 21968 from the Ivory Coast belong to other species, probably not yet described. Other records are probably due to confusion with *C. rufescens*.

Cissus rufescens Guill. et Perr. in Guill. Perr. et A. Rich., Fl. Seneg. Tent. **1**, 133 (1831) ; Planchon in DC., Monogr. Phan. **5**, 486 (1887) ; Gilg et Brandt in Engl., Bot. Jahrb. **46**, 473 (1912).

Vitis rufescens (Guill. et Perr.) Miq. in Ann. Mus. Bot. Lugd.—Bat. **1**, 83 (1863).

[*V. caesia* (non (Afzelius) Sabine) Baker in Oliv., Fl. Trop. Afr. **1**, 396 (1868), *pro parte*.]

V. Durandii Lécard, Not. sur les vignes du Soudain, ed. I, Saint Louis du Sénégal, 1880, ed. 2. Vesoul 1881*.

[*C. caesia* (non Afz.) Hutch. et Dalz., Fl. W. Trop. Afr. **1**, 476 (1928), *pro parte*.]

[*C. coryfolia* (non (Baker) Planch.) Chevalier in Chev., Expl. Bot. Afr. Occ. Franç. **1**, 142 (1920), *pro parte*.]

Habit : a creeping and trailing, or climbing vine, with herbaceous stems up to 3 m. long. Well-developed tendrils are not present on any of the herbarium material. They are absent on more than half of the specimens, and in the remainder they are slender, unbranched, not coiled and 4 to 5 cm. long. This may only apply to the young apical parts of the plants, which alone are usually collected. *Branchlets* slender even when young, not glaucous but with a sparse to dense indumentum of short yellow hairs, becoming almost glabrous when older. *Leaf shape and size* variable : petiole from 0.5–4 cm. long, and exceptionally may reach a length of 7.0 cm., usual length about 2 cm. ; length of lamina varies from 5–13.5 cm., usually from 7–8 cm. Most plants have reniform-orbicular leaves, but the range is from suborbicular to subcordate, and there is a tendency for the leaves to be 3–5-lobed. Margin beset with spreading, setaceous teeth, 1 mm. long and 2–3 mm. apart. *Upper leaf surface* : characteristically there are a few short stout hairs, scattered

This reference is given by Planchon *op. cit.* I have not seen a copy of this paper. It is not present in the library of the Herbarium, Royal Botanic Gardens, Kew, or in that of the Department of Botany, British Museum (Nat. Hist.).

along the main nerves. In some specimens there are also numerous, very short hairs, and wax particles scattered over the surface of the lamina. This is variable. *Lower leaf surface* in both young and old leaves differs from *C. caesia* in that the hairs are entirely confined to the nerves and veins. They are 2–3 times as long as those of that species, straighter and rust-coloured. In the young leaf, where the intervenal areas are not expanded, they appear to cover the whole of the lower surface. The mature leaf has a very distinctive appearance due to the presence of small angular wax particles, 0.03 mm. diam., regularly distributed over the surface. In young leaves, although present, they are much smaller, and again in very old leaves they may not be very conspicuous (see Plate 1). The black, medifixed structures, so conspicuous in *C. caesia*, are usually absent from the leaves of this species, although they occur on the pedicel, perianth and ovary. They were only found in two specimens, and there they were very few.

SENEGAMBIA. Without locality or date, *Heudelot* 837 (Herb. Mus. Brit. Herb. Paris, Herb. Fielding, Oxon.), small mature leaves and flowers. Kaolak, 160 m. south-east of Dakar, no date, *Kaichinger*, number illegible (Herb. Paris). Without date or locality, *Leprieur s.n.* (Herb. Paris.), originally labelled "*C. populnea* Fl. Seneg." Without date or locality, *Perrottet s.n.*, syntype (Herb. Brussels. ex Herb. Paris), fragment with flowers.

GAMBIA. "In sylvis . . . Albreda", 1827, *Leprieur s.n.* (Herb. Paris.). Albreda, 1829, *Perrottet* 139, syntype (Herb. Mus. Brit.), mature leaves and flowers, and fruit at all stages. Without locality or date, *Skues s.n.* (Herb. Kew). leaves, flowers and young fruit.

FRENCH SUDAN. Tenenkou (?) midway between Bamako and Timbuktoo, 30 March 1899, no collector's name, 660 (Herb. Paris.).

GOLD COAST. Northern Territories and Ashanti, 15 May 1927, *Sir A. E. Kitson s.n.* (Herb. Mus. Brit.), mature leaves and flowers.

DAHOMEY. Atacora Mts., Samba Country, from Kouba to Farfa, alt. 450 to 600 m., 16 June 1910, *Chevalier* 24030 (Herb. Kew.), young leaves and flowers, cited as *C. corylifolia* by Chevalier (Chev., l.c.), and as *C. pseudocaesia* Gilg et Brandt in Fl. W. Trop. Afr.

NIGERIA. No precise locality, 1858, *C. Barter* 1273 (Herb. Paris., Herb. Kew., determined by Gilg and Brandt). Abinsi, 18 May 1912, *Dalziel* 672 (Herb. Kew.), young and mature leaves and old flowers, "a ground trailer". Ogoja Province: Afi River Forest Reserve, 3 June 1946, *A. P. D. Jones* and *Onochie*, *Forest Herbarium Ibadan No.* 18957 (Herb. I.F.I., Oxon. ex Ibadan), mature leaves and young fruits", in derived *Imperata-Crossopteryx* savannah, creeping and trailing vine, with stems up to 3 m. long: fruits on erect inflorescences, white, flushed pink on top; nodes and pulvini flushed brownish red". Nupe District: near Chorati Railway Station, 3 Aug. 1946, *R. W. J. Keay*, *Forest Herbarium Ibadan No.* 20152 (Herb. I.F.I., Oxon. ex Ibadan), young and mature leaves and mature fruit", grassy bank by railway line, ground trailing herb, young leaves and stems rose-madder becoming green, fruits magenta, suffused pale pink". Bauchi Plateau, Apr. 1929, *Lely* 211 (Herb. Kew.), leaves and flowers. N. Nigeria: Pankshin alt. 1530 m., 14 July 1921, *Lely* 436 (Herb. Kew.), mature leaves and flowers and young fruit, "climbing and creeping up to 3 m." Lagos, Feb. 1902, *Sir*

W. MacGregor 297 (Herb. Kew.), leaves and fruit. Lagos Colony : on road to Asipa, Aug. 1901, *Phillips* 23 (Herb. Kew.), young and mature leaves, flowers and young fruit. N. Nigeria, 16 June 1909, *B. E. B. Shaw* 47 (Herb. Kew.), 4 very large leaves, and fruits, "fruits small and red".

FRENCH CAMEROONS. *Kaujang*, alt. 390 m., no date, *Ledermann* 3662 (Herb. Kew. ex Berlin, det. Gilg et Brandt), mature leaves and flowers. East of Nana River, 900 m. alt., 8 May 1914, *Mildbraed* 9305 (Herb. Kew.), leaves, flowers and fruit. Buar, 6° N., 15° 35' E., alt. 1000 m., May 1914, *Mildbraed* 9353 (Herb. Kew.), mature leaves and flowers.

UBANGI-SHARI-CHAD. Chari Chad, no precise locality, 20 Apr. 1903 *Chevalier* 8099 (Herb. Paris.), cited as *C. rufescens* by Gilg and Brandt, *l.c.* Chad?, Upper Logone R., 25 May 1848, *Lenfant s.n.* (Herb. Paris.). "Oubangni, region de Yalinga", 1 May 1921, *G. le Testu* 2700 (Herb. Paris.).

Doubtful Specimens.

The five specimens which Gilg and Brandt, *l.c.*, cite under *C. pseudo-caesia* are all intermediate between *C. caesia* and *C. rufescens*, and are possibly hybrids between those two species. If that is so, the degree of resemblance to the parent species varies considerably. The four Lécard numbers: 38, 162, 163 and 178, are very close to *C. rufescens*, and their affinity with *C. caesia* is slight. It would be premature to assert that they are hybrids, until more is known from field and experimental evidence about the behaviour of the two parent species. The fifth specimen, *Scott Elliot* 4907, the type, is more certainly intermediate in its characters, and there is stronger evidence of its hybrid nature (see page 58).

Lécard 38, 178 (Herb. Brussels.), no date : in branchlets, tendrils and leaf shape these specimens closely resemble *C. rufescens*. The leaves are larger (14.5 cm. long) than is usual for that species, but much larger than those recorded for *C. caesia*. The hairs on the veins of the lower surface of the leaf are short and curly, more resembling *C. caesia* than *C. rufescens*. In the intervenal areas wax-particles are arranged as in *C. rufescens*, but a few are elongated and resemble the short hairs of *C. caesia*. Black medifixed structures are present, a feature not usually found in *C. rufescens*. It may be noted that *C. caesia* has only once been satisfactorily recorded

from outside Sierra Leone, and that the possibility of it being the parent of a hybrid in Upper Senegal is remote. The slight similarity which these specimens show with *C. caesia* may be accidental. *Lécard* 162, 163 (Herb. Brussels.), no date, correspond in branchlets and leaf shape to *C. rufescens*. Tendrils are absent. The leaves are 11–12 cm. in diameter. The hairs on the veins on the undersurface of the leaves are short and curled as in *C. caesia*, and the wax particles on the lamina are smaller than is usual for *C. rufescens*, but there are no hairs interspersed among them like those of *C. caesia*. The resemblance of these two numbers to *C. caesia* is very slight.

Cissus pseudocaesia *Gilg et Brandt* in Engl., Bot. Jahrb. **46**, 473 (1912) ; *Hutch. et Dalz.*, Fl. W. Trop. Afr. **1**, 473, 476 (1928).

Apart from the four Lécard numbers, dealt with above, this species is only represented by : the type, *Scott Elliot* 4907 ; one other specimen

collected on the same expedition, *Scott Elliot* 4135 ; and a single specimen collected by Vogel, in the Brussels, Paris, London and Oxford herbaria. The three specimens combine the characters of *C. caesia* and *C. rufescens* to a different degree, but more closely resemble the latter. All were collected in Sierra Leone, the only country from which *C. caesia* has been recorded with the exception of a single occurrence in N. Nigeria. Although there are no records for *C. rufescens* from Sierra Leone, it probably is present there, in view of its extensive distribution in W. Africa. The evidence suggests that they are in fact hybrids.

The young stems of the type have the glaucous, waxy covering of *C. caesia*, as well as the indumentum of *C. rufescens*. Tendrils are poorly developed as in the young shoots of both species. The leaf-shape is orbicular-cordate, and the lamina is 12.0 cm. long, the petiole measuring only 1 cm. The hairs on the undersurface of the leaves, although longer than in *C. rufescens*, are curly as in *C. caesia*. The wax particles are smaller than in *C. rufescens*.

Scott Elliot 4155 has glaucous and glabrous stems. The hairs on the nerves and veins are of the caesia-type, and as well as wax-particles there are a number of minute hairs scattered among them. A few black medifixed structures occur on the leaves of both specimens.

SIERRA LEONE. No precise locality, 18 Dec. 1891, *Scott Elliot* 4155 (Herb. Kew.). Konadugu District : " in long grass by roads, Ninia and common up to 1200 m., Falaba ", 18 Feb. 1892, *Scott Elliot* 4907, isotype (Herb. Kew., Herb. Mus. Brit.). Without locality or date, *Vogel* s.n. (Herb. Kew.).

Cissus doeringii Gilg et Brandt in Engl., Bot. Jahrb. **46**, 473 (1912) ; Hutch. et Dalz., Fl. W. Trop. Afr. **1**, 473, 476 (1928).

C. corylifolia (non (Baker) Planch.), Chev. var. *latifolia* A. Chev., nomen in Expl. Bot. Afr. Occ. Franç. **1**, 142-3 (1920).

Habit : a sub-shrub about 1 m. high, with erect, non-cirrhose or obsoletely cirrhose branches. *Branchlets* very stout and woody, covered with an indumentum of strong straight hairs : there are no tendrils on the plants cited below. *Leaf shape and size* variable ; petiole 1-2 cm. long, lamina 7.5-9 cm. long ; the shape varies from ovate to orbicular-cordate, and may be orbicular, orbicular-reniform, or polygonal-orbicular ; base occasionally deeply cordate, and there is a tendency for the leaves to be shallowly lobed ; occasionally they are very asymmetrical. The marginal teeth are very similar to those of *C. caesia* but are directed slightly forwards and not borne at right-angles to the margin. *Upper leaf surface* : short, stout, straight hairs are fairly evenly but sparsely distributed over the leaf surface, but mostly occur on the nerves and veins ; there are also a few wax-particles. *Lower leaf surface* : the intervenal areas are covered by an indumentum, very similar to that of *C. caesia* as it consists of densely arranged, short, straight, grey hairs, completely hiding the lamina beneath. There are numerous, medifixed structures borne on both lamina and veins. The hairs on the lamina and veins differ from those of *C. caesia* in being much longer ($1\frac{1}{2}$ 2 times as long), stouter and uncurled. The fruit according to Gilg and Brandt is larger than in *C. caesia*, being 0.9 cm. in diameter, compared with 0.5 cm. in *C. caesia*. This character is of less value in the herbarium than in the field, as it is

difficult to know if fruits are mature or not, and, they contract on drying.

FRENCH GUINEA. Oussoulou District : between Késséridou and Oussoudou, 26 February 1909, *Chevalier* 20838 (Herb. Kew.). Cited by *Chevalier* (*l.c.*) as *C. corylifolia* var. *latifolia* A. Chev.

SIERRA LEONE. Borawa Plateau, 22 July 1937, *J. E. Edwardson* 89 (Herb. I.F.I. Oxon.), stem and leaves, "in grass near rocks".

IVORY COAST. Upper Sassandra : Toura country, Mt. Dourou, up to 700 m. alt. near Koualé, 27 May 1909, *Chevalier* 21734 (Herb. Paris.), young and old leaves and mature fruits. Toura country between Koualé and Kouroukoro, 28 May 1909, *Chevalier* 21750 (Herb. Paris.), young and old leaves and flowers. Both specimens are cited as *C. corylifolia* var. *latifolia* A. Chev. by *Chevalier l.c.*

GOLD COAST. West Province Ashanti : Techeri, 20 June 1913, *Chipp* 475 (Herb. Kew.), young and mature leaves, and flowers, "shrub, fruit green to red, black when mature, savannah".

TOGO. Misahöhe, 15 May 1894, *Baumann* 30, syntype (Herb. Kew. ex Berlin, det. Gilg et Brandt), young and old leaves, and flowers. Misahöhe, *Baumann* 479, syntype (Herb. Berlin). *Doering* 204, syntype (Herb. Berlin).

Cissus corylifolia (*Baker*) *Planch.* in DC., Monogr. Phan. **5**, 484 (1887) ; Gilg et Brandt in Engl., Bot. Jahrb. **46**, 473 (1912) ; Hutch et Dalz. Fl. W. Trop. Afr. **1**, 473, 476 (1928).

C. dahomensis A. Chev. nomen in Expl. Bot. Afr. Occid. Franc. **1**, 143 (1920), *pro parte*, non *C. dahomensis* A. Chev. in Rev. Int. Bot. Appl. d'Agr. Trop. 335x6, 458 (1950)*.

Vitis corylifolia Baker in Oliv., Fl. Trop. Afr. **1**, 396 (1868).

Habit : herbaceous ; 1 m. high ; stems erect, little branched, arising from succulent woody rootstock. *Branchlets* thick and succulent ; not glaucous, and covered with an indumentum of long, more or less straight, pale-coloured hairs ; tendrils absent. *Leaf shape and size* : petiole about 4.0 cm. long, lamina 7–14 cm. long ; shape varies from reniform to cordate-orbicular, margin usually repand or indefinitely lobed ; the teeth are larger (2–3 mm.) than in the other four species, and are directed forward. *Upper leaf surface* : the hairs, which are confined to the nerves and veins, vary from few to many ; there are also a few scattered wax particles. *Lower leaf surface* : the nerves and veins which are not so prominent as in the other species are much wider in diameter, and form a close network ; they are clothed with long, more or less straight, colourless hairs. There are no hairs on the lamina, but a number of large, angular, wax particles of about 3–4 times the diameter of those of *C. rufescens*. There are no black, medifixed structures on the leaves or indeed anywhere on the plant.

FRENCH SUDAN. Upper Volta : Gourma, from Diapaga to Fada, near Diapaga, July 1910, *Chevalier* 24426 *bis* (Herb. Kew.), young and old leaf and flowers.

*When *Chevalier* first published this name as a *nomen nudum* in Expl. Bot. A.O.F. he cited 2 specimens : Chev. 24426 *bis*, and Chev. 23679. There are fragments of both specimens in the Kew herbarium. The first belongs to *C. corylifolia*, but the second is quite different and belongs to a trifoliolate species which has recently been published with a diagnosis as *C. dahomensis* Chev. (Rev. Int. Bot. Appl.) It is based on Chev. 23679 and Chev. 24470. Chev. 24426 *bis* is not mentioned.

GOLD COAST. Afram Plains, 15 March 1900, *Johnson* 704 (Herb. Kew.), young and mature leaves and flowers.

NIGERIA. Nupe, no date, *Barter* 1271 type (Herb. Kew.), young and old leaves, flowers and fruits. Northern Nigeria : Abinsi, 30 April 1912, *Dalziel* 673 (Herb. Kew.), young and mature leaves, flowers, and fruit at all stages. Nabardo, alt. 690 m., 20 May 1921, *Lely* 207 (Herb. Kew.), flowers and leaves, "leaf attains a diameter of 30 cm."

KEY TO THE FOUR SPECIES.

(*C. pseudocaesia* is omitted).

Plant erect, not climbing or trailing, stems about 1 m. high : tendrils absent or vestigial.

Stems stout, little branched, fleshy, indumentum of long (0.5–0.8 mm.) straw-coloured hairs. Nerves and veins of lower leaf surface not very prominent, flattened, covered by a dense indumentum of long, straight hairs (0.5–0.9 mm.). Large (0.13 mm. diam.) angular wax-particles scattered irregularly over intervenal areas, 0.15 to 0.3 mm. apart. No black medifixed structures

C. corylifolia

Stems stout, woody ; dense indumentum of short (c. 0.2 mm.) grey or brown hairs. Nerves and veins of lower leaf surface prominent, not flattened, covered with straight hairs (0.16–0.48 mm.) longer than those of *C. caesia*. Indumentum of intervenal areas dense, of short, grey hairs, very like those of *C. caesia*, completely obscuring lamina. Black, medifixed structures scattered on lamina, nerves and veins *C. doreingii*

Plant climbing or trailing, stems up to 3 m. long : tendrils present, well developed and coiled on older stems.

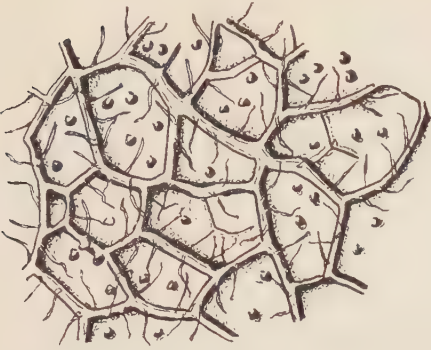
Stems slender, glabrous, covered with persistent, glaucous, waxy bloom. Nerves and veins covered with short (0.1–0.3 mm.), curly hairs. Intervenal areas obscured by dense indumentum of short, grey hairs. Black, medifixed structures scattered over lamina, nerves and veins *C. caesia*

Stems slender, not glaucous, with indumentum of short (0.3 mm.) rufous hairs, occasionally becoming glabrous later. Long (0.6–0.75 mm.) straight hairs on nerves and veins rather sparse. Intervenal areas glabrous, but with regularly spaced, small (0.032 mm. diam.) wax-particles. Black medifixed structures usually absent *C. rufescens*

So far as I know all of the material of these five species in the following herbaria has been examined : Herbarium du Jardin Botanique de l'Etat, Bruxelles ; Herbarium, Muséum d'Histoire Naturelle de Paris ; Herbarium, Department of Botany, British Museum (Nat. Hist.) ; Herbarium, Royal Botanic Gardens, Kew ; Fielding Herbarium, Department of Botany,

Lower Surfaces of Leaves of four species of *Cissus*.

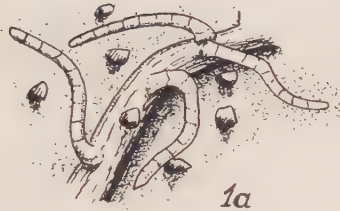
- 1, 1a, *Cissus corylifolia* showing large irregularly arranged wax-particles.
- 2, 2a, *C. rufescens*, showing smaller, regularly arranged wax-particles.
- 3, 3a, *C. caesia*, showing curly hairs on veins, very short hairs on lamina of intervenal areas, and black medifixed structures.
- 4, 4a, *C. doreingii*, showing straight hairs on veins, hairs on lamina longer than in *C. caesia* and black medifixed structures.
- 1, 2, 3, and 4, $\times 10$ (diameters). 1a, 2a, 3a, 4a, $\times 50$ (diameters).



1



2



1a



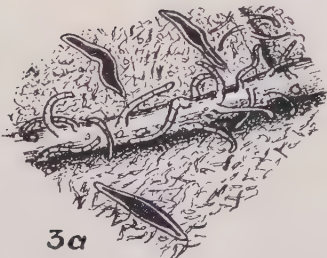
2a



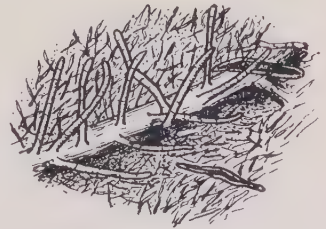
3



4



3a



4a

Oxford ; Herbarium, Imperial Forestry Institute, Oxford. I wish to acknowledge my indebtedness to the directors of these institutions for their kindness in sending material on loan, or in granting permission to examine specimens in their respective herbaria. I owe much to the stimulating interest and invaluable advice of Mr. E. Milne-Redhead and Mr. J. P. M. Brenan, both of the Royal Botanic Gardens, Kew, who besides helping in many other ways, kindly read and corrected the paper in type-script.

Papers of the Michigan Academy of Science*—The thirty-second volume of the Papers of the Michigan Academy of Science Arts and Letters was published in 1948. This volume, in addition to a number of contributions under the headings Zoology, Geography, Geology, Anthropology, etc., includes ten papers on Botany and one on Forestry. Among the papers in the botanical section are "Interesting species of vascular plants collected in western Michigan" by Clayton W. Bazuin ; "Additions to an annotated list of the higher plants of the region of Douglas Lake, Michigan III" by Frank C. Gates and John H. Ehlers ; "Some lichens from Idaho" by Joyce Hedrick ; "Studies in the genus *Poria* I. *Poria carneopallens* (Berk.) Cook" by Josiah L. Lowe and "New and interesting species of Basidiomycetes II" by Rolf Singer. The volume, which contains many illustrations and charts in the text and a number of photographic plates, maintains the high standard associated with the University of Michigan.

H. S. MARSHALL.

*Papers of the Michigan Academy of Science Arts and Letters. Volume XXXII (1946). Ann Arbor : University of Michigan Press. London : Geoffrey Cumberlege, Oxford University Press. 1948. Pp. xiv + 522 + iii. Price 60/-.

Plant Viruses*—It is a tribute to Mr. Bawden's remarkably lucid exposition of a mass of abstruse data that a third edition of his "Plant viruses and virus diseases" has been required in eleven years. Though the text has been entirely rewritten and brought up to date the layout of the book is unchanged. Especially salutary in coping with a literature so permeated by wild speculations and flimsy hypotheses is the author's ruthlessly sceptical outlook and critical analysis of commonly accepted conclusions. In the field of virus nomenclature and classification he adopts the rational opinion that a classification of viruses should be based on properties of viruses, not on host reactions. By this criterion all the proposed systems are found wanting. Indeed, one suspects that if the authors who attempted to apply the binomial system to viruses had stopped to consider what they were actually naming these preposterous systems would never have appeared in print.

R. W. G. DENNIS.

*Plant Viruses and Virus Diseases. F. C. Bawden. Waltham, Mass., U.S.A. : Chronica Botanica Co., London, W.C.2 : Wm. Dawson & Sons Ltd., 1950. Pp. xv + 335. Price \$6.00.

ADDITAMENTA AD FLORAM ANATOLIAE : II.*

P. H. DAVIS.

After the first part of this series appeared, I was able to make another expedition in Southern Anatolia, from Lycia to the Amanus Mountains, during the summer of 1949. Despite an exceptionally arid year, a herbarium of about 1,700 gatherings was made ; this has been added to my 1947 collection so that both can be determined together. To get into step, however, I am annotating in Part 2 the *Labiatae* of my 1949 journey, that family having been the subject of Part 1 of this series.

A note is required on earlier botanical work done in the area traversed in 1949. In the Lycian Taurus, Tahtali Dağ (ancient Solyma) was botanised by the writer in 1947, but had not been previously explored ; Çalbali (Bereket) Dağ was climbed by Pestalozza over a century ago. The floras of these two mountains, though so close together, are curiously dissimilar. The area is very rich in endemics, several of which (e.g. *Dorystaechas hastata* Boiss. et Heldr., *Globularia davisiana* O. Schwarz and *Asyneuma pulvinatum* P. H. Davis) are undoubtedly relicts.

The painfully difficult journey through the Pisidian mountains between Antalya and the lake of Beyşehir was through a region almost unexplored botanically, though Dedegöl Dağ (part of Anamas Dağ) or an adjacent mountain appears to have been hastily visited by the indefatigable Heldreich in 1845. Here the flora of Bozburun Dağ (with the upper 1000 m. composed of calcareous conglomerate) was very different from that of the cold limestone massif of Dedegöl Dağ further north—a fact which shows how important it is to explore the many neglected peaks and ranges of Asia Minor. The supply of new species seems inexhaustible.

The neighbourhood of Ermenek in the Isaurian Taurus was botanised by Heldreich in 1845, and superficially by Péronin in 1872 ; in 1948 it was visited by A. Huber-Morath, H. Reese and J. Renz. The region, consisting of a mosaic of chalky hills and areas of compact limestone cut by deep ravines, is botanically rich. My journey from Ermenek to Anamur took me through a region of the Taurus that was previously unbotanised. Bulgar Dağ in Cilicia has of course been visited by several collectors since Kotschy's pioneer journey of 1836, and its flora is now relatively well-known. In the Amanus, Didlil Dağ may only have been botanised by Haradjian in 1908, although it is possible that Ina Meincke collected there (see note under *Stachys amanica* P. H. Davis below). The salt lakes of Central Anatolia do not appear to have been previously visited in late summer, when the *Chenopodiaceae* are best developed.

As so much of the country visited in 1949 was through little-known territory, a concise itinerary is given below. The journey was complementary to that of my 1947 expedition, an account of which appeared in J. Roy. Hort. Soc. **74** (3-4) : 1949. In 1949, except on the days indicated, I travelled with horses. The expedition has being described for the same horticultural journal (**76** (2) : 1951). My itinerary was as follows :—

*Continued from Kew Bull. **1949**, 393-426 (1949).

1. *Eastern Lycian Taurus (Prov. Antalya) ; accompanied by Kâmil Bilger and A. Attila.*

July 7 : Antalya to Kemer by motor-boat, with a visit to Gönük Da. **8 :** Kemer to Kuzdere Y. (900 m.) on Tahtali Da. **9 :** to Çukur Y. (1650 m.). **10 :** climbed Tahtali Da. (2375 m.) on foot up the W. side, returning to Çukur Y. down the N. side via Peynirlik Y. **11 :** from Çukur Y. northwards to Ovacık (1100 m.) on E. flank of Teke Da. **12 :** visited E. slopes of Teke Da. **13 :** Ovacık to Tepedelen Y. (1700 m.) on Çalbali (Bereket) Da., via Söğüt Cümâsi Y. (1300 m.). **14 :** climbed Çalbali Da. (2262 m.) on foot up the N. side from Tepedelen Y., descending to Fesliken Y. (1800 m.) via Kar Çukuru Y. **15 :** visited cliffs E. of Fesliken Y., then, via Çukur Ardiç Y., to Söğüt Y. (1200 m.) for the night. **16 :** to Antalya, via Çakırlar and the sea-shore. **17-20 :** in Antalya, with excursion to Termessus on July 19 by car.

2. *Pisidian mountains between Antalya and Beyşehir Lake (Prov. Antalya, Isparta and Konya) ; accompanied by Kâmil Bilger.*

July 21 : Antalya to Gebiz by car, via mouth of the Aksu Ç. **22 :** to Pinargözü (600 m.) on S.W. flank of Bozburun Da. **23 :** to Boğaz Ağzi. **24 :** to Tozlu Çukur Y. (1900 m.) on N. side of Bozburun Da. **25 :** climbed on foot as near as possible to top of Bozburun Da. (2504 m.), descending N.E. side to Taşlı Y. (1700 m.). **26 :** at Taşlı Y. **27 :** northwards to Kuzdere (1100 m.) in Kozlu D. **28 :** to Koca Pinar Çe. (1500 m.) on W. side of Sarp Da., via Çimen Ov. **29 :** to Tota Beyli Y. (1500 m.), via W. side of Kuyucuk Da. **30 :** to Selköşe (1200 m.), via Daribükü (900 m.)—all day on metamorphic rocks. **31 :** at Selköşe.

Aug. 1 : to Oruz Gaz Y. (1700 m.) on S. flank of Dedegöl Da. (limestone starts at 1400 m.). **2 :** to Taş Oluk Y. (2100 m.) on Dedegöl Da., via 2400 m. pass (difficult for horses!) and cirque called Anıçı (2200 m.). **3 :** on foot to summit of Dedegöl Da. (2980 m.) via the tarn Dedegöl (2300 m.) ; returned to Taş Oluk Y. **4 :** to Hoyran, via Çamurlu Y. **5 :** motor-boat to Beyşehir, bus to Konya. **6-10 :** in Konya.

3. *Taurus between Karaman and Anamur (Prov. Konya and Mersin ; Isauria and Cilicia Trachea).*

Aug. 11 : Konya to Karaman by bus. **12 :** to Ermenek by post-bus. **13 :** around Ermenek. **14 :** hired lorry to Oyuklu Da. (near pass between Karaman and Ermenek), via Kaniş D. ; returned to Ermenek. **15 :** from Ermenek southwards to Sarıvadi, via Göksu Ç. (600 m.). **16 :** to Beşkuyu (1800 m.) via Hamitseydi Boğ. (1500-1700 m.). **17 :** to Çamurlu Y. (2100 m.). **18 :** to Kükür (700 m.), crossing the range in the vicinity of Deliktaş Da. and via Olucak Y. (1500 m.). **19 :** to Anamur, via Saridana. **20 :** to Silifke by post-bus, via Gülnar. **21 :** to Mersin by lorry. **22-24 :** in Mersin.

4. *Dildil Dağ in Amanus (Prov. Adana, distr. Bahçe).*

Aug. 25 : Mersin to Haruniye by train. **26 :** to Atlik Y. (1700 m.) on Dildil Da., via Gökçayır (420 m.). **27 :** on foot to summit of Dildil Da. ; returned to Haruniye via Başkonuş Y. (1700 m.) and Huseyin Oluk Çe. (1400 m.). **28 :** Haruniye to Mersin by train. **29-30 :** in Mersin.

5. *Bulgar Dağ in Cilician Taurus (Prov. Adana and Niğde).*

Aug. 31 : Mersin to Pozanti by train, with excursion to Cilician Gates (Külek Boğ.) by hired lorry. **Sept. 1** : Pozanti to Meydan Y. (2400 m.) on E. flank of Bulgar Da. **2** : to Sari Tepe Y. (2700 m.) on Kizil Tepe. **3** : descent to Çiftehane, via Alihoca (1300 m.). **4** : train to Konya. **5-6** : in Konya. **7** : excursion to Bozkir by car.

6. *Tuz Gölü (Prov. Konya ; Lycaonia).*

Sept. 8 : Konya to Cihanbeyli by car, visiting the small salt lake, Acituzgölü. **9** : by car to Yavşan Memlehası near Tuz Gölü ; visited the lake by using the light railway of the salt factory ; by car to Ankara.

In the annotation I have taken the Göksu Deresi in the region of Ermenek as the boundary between Isauria (to the N.) and Cilicia Trachea (to the S.). To avoid the tricky question of genitival endings, the contractions proposed by the Permanent Committee on Geographical Names for British Official Use in *Glossaries* : 7, *Turkish* (1945) have been adopted. These are : *Boğ.* for *Boğaz* (gorge), *Ça.* for *Çay* (river), *G.* for *Göl* (lake), *D.* for *Dere* (valley), *Da.* for *Dağ* (mountain), *Ov.* for *Ova* (plain), and *Y.* for *Yayla* (summer pasture) ; to these I have added *Çe.* for *Çeşme* (spring).

I am deeply indebted to The Cross Trust and to the Royal Horticultural Society for generous grants towards the cost of the expedition. I also wish to thank Dr. A. Huber-Morath, whose journeys in Anatolia are leading to the discovery of so many new plants, for collaboration in the naming of certain new species.

LABIATAE (continued)**Ajuga chia** Schreb., Pl. Vert. Unilab., 24 (1774) var. **chia**.

Prov. Isparta, distr. Sütçüler (Pisidia) : between Tota Beyli Y. (on Kuyucuk Da.) and Daribükü, fallow fields, metamorphic substrate, fl. yellow, 30 Jul. 1949, 15896 ; Sarp Da., above Kuzdere, fallow land, 28 Jul. 1949, 15828. Prov. Konya, distr. Beyşehir (Isauria) : Hoyran, fallow fields, fl. yellow, 5 Aug. 1949, 16119.

var. **latiloba** Boiss., Fl. Or. **4**, 803 (1879).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da. above Çukur Y., 900–200 m., 25 Jul. 1949, 15622.

var. **suffrutescens** Boiss. Fl. Or. **4**, 803 (1879).

Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp Da., 1500 m., 28 Jul. 1949, 15799.

f. inter var. **suffrutescentem** Boiss. et var. **latilobam** Boiss.

Prov. Antalya (Lycia) : Çalbalı Da., 2000–2100 m., 14 Jul. 1949, 15283. Prov. Niğde, distr. Ulukışla (Cilicia) : Bulgar Da. near Sari Tepe Y. above Alihoca, 2 Sept. 1949, 16569.

Further work is needed on the forms of *A. chia* Schreb., particularly with reference to var. *suffrutescens* Boiss. and var. *tridactylites* (De Ging ex Benth.) Boiss. which are difficult to distinguish from one another. Although Turrill (New Phytol. **33**, 225 : 1934) has recorded var. *tridactylites* from Asia Minor, I have preferred to name my similar Anatolian forms var. *suffrutescens*. *A. chia* var. *tridactylites* was originally

described (as a species) from Sinai and Lebanon, and was said to have a pink corolla—a feature which I have never seen in any form of *A. chia* from Palestine to Greece, although in pressed specimens the red pigment of the corolla-spots sometimes ‘runs’. Boissier (Fl. Or. **4**, 808) gives a more southerly distribution to var. *tridactylites* than to var. *suffrutescens*, and does not record the former from Turkey.

The typical form of *A. chia* is mainly a plant of fallow fields in the Levant, being often replaced by var. *suffrutescens* in more stable natural habitats, and in rocky alpine regions in the Taurus by var. *latiloba*. Many intermediates occur.

Ballota cristata P. H. Davis in Kew Bull. 1949 : 394 (1949).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da. at Gürleyik Y., 1400 m., 9 Jul. 1949, 15128 ; Teke Da. near Ovacik (above Kemer), where woods have been cleared, often co-dominant with *Phlomis grandiflora*, 12 Jul. 1949, 15338 ; distr. Gebiz (Pisidia), on Bozburun Da. between Pinargözü and Boğaz Ağzi, 1400 m. 23 Jul. 1949, 15501 ; and in Kozlu D., N. of Bozburun Da., 1100–1200 m., stony slopes, 27 Jul. 1949, 15753.—One of the commonest subalpines in Pisidia and Eastern Lycia.

Ballota saxatilis Sieber ex J. & C. Presl, Delic. Pragenses, **1**, 81 (1822).

Prov. Konya, distr. Ermenek (Isauria) : Ermenek, rocks, fl. purple, 13 Aug. 1949, 16153 ; Kaniş D. (between Ermenek and Oyuklu Da.), rocky places, fl. purple, 14 Aug. 1949, 16174. Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ. between Sarivadi and Beşkuyu (S. of Ermenek), rocks, 16 Aug. 1949, 16240 ; between Beşkuyu and Çamurlu Y. (S. of Ermenek) in crevices of outcropping rocks, 1900 m., 17 Aug. 1949, 16267. Prov. Adana, distr. Bahçe (Amanus) : Gökçayır at foot of Dildil Da., in limestone ravine, sloping rocks, stems erect, fl. purplish pink, 27 Aug. 1949, 16417 (*forma caulibus strictis erectis, indumento calycum et foliorum brevissime stellato-tomentoso, foliis paulo minoribus anguste ovatis a typo differt*).

The last gathering cited approaches var. *brachyodonta* Boiss. (*e descr.*), but the calyx-teeth are scarcely shorter than in the typical form of the species.

I am indebted to Mr. B. L. Burtt for the following note on the nomenclature of *B. saxatilis* :

“ In his paper (J. of Bot. **75**, 190 : 1937) dealing with Russel’s Aleppo plants, Eig adopted for this species the name *B. rugosa* (Banks & Sol.) Benth. This, however, is incorrect. *B. rugosa* Benth. is based not on the *Marrubium rugosum* of Banks & Sol., but on the independently described *M. rugosum* Desf. ; the latter being a later homonym, *B. rugosa* Benth. must stand as a new name dating from Benth’s publication, and not as a new combination based on Desfontaine’s plant.

“ Accepting Boissier’s circumscription of this species, *Marrubium rugosum* Banks & Sol. of course provides the earliest epithet, but *Ballota rugosa* Benth. prevents its transference to the latter genus. *B. saxatilis* Sieber is cited by Boissier and others as “ ex Benth. ”, but it was in fact validated by J. & C. Presl (Delic. Pragenses, **1**, 81 : 1822). *B. saxatilis*

Sieber ex J. & C. Presl therefore provides the earliest name for this species ”.

Calamintha ascendens Jordan, Obs. Pl. Nouv. Rar. Crit. (4) 8 (1846). (*C. officinalis* Mönch, Meth. 409 (1794) *pro parte et auct.*, *nomen ambiguum*, cf. Pugsley in J. of Bot. **61**, 185 : 1923).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Hüseyin Oluk Çe., 1800 m., 27 Aug. 1949, 16394.—The inflorescence is shorter and fewer flowered than in the type.

Calamintha betulifolia Boiss. et Bal. in Boiss., Diagn. Ser. 2 (4) 14 (1859) subsp. nov? (“*Calamintha* sp. nov.?” Davis in Kew Bull. 1949 : 397.)

Prov. Antalya, distr. Kemer (Lycia) : Kesme Boğ. near Kemer, on dry mossy rocks in shade, fl. very pale lilac, 8 Jul. 1949, 15150.

Though adequate flowering material is still not available of this plant, it seems most probable that it represents a new subspecies of *C. betulifolia*. The species is known in its typical form only from Cilicia and Amanus. Forbe's specimen from Finike in Lycia is as glabrescent as in typical *C. betulifolia*, and the calyx is 11 mm. long ; it is therefore intermediate between the latter and my Lycian material from Kemer, which differs from the type mainly in its more hirsute indumentum, and shorter calyx (7–9 mm. long) bilabiate to $\frac{1}{4}$ of its length. More material is needed of this group of *Calaminthae* from between Cilicia and Lycia.

Calamintha nepeta (L.) Savi, Fl. Pisana, **2**, 63 (1798).

Prov. Niğde, distr. Ulukışla (Cilicia) : near Alihoca at N. foot of Bulgar Da., 1200–1300 m., erect, fl. violet, 3 Sept. 1949, 16523. Prov. Adana, distr. Bahçe (Amanus) : near Haruniye, 400 m., bank of dry river-bed, erect, fl. pale lilac, 26 Aug. 1949, 16375.

Calamintha origanifolia (Lab.) Boiss., Fl. Or. **4**, 579 (1879), *sensu lato incl. C. florida* Boiss.,—cf. Davis in Kew Bull. 1949 : 395 (1949).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da. near Peynirlik Y., 1600 m., 10 Jul. 1949, 15111. Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp Da., 1500 m., stony slopes, stems ascending-erect, fl. lilac, 28 Jul. 1949, 15791 ; Dedegöl Da. above Dedegöl tarn, 2400–2500 m., scree, fl. lilac, 3 Aug. 1949, 16001 ; Dedegöl Da. near the cirque Aniçi, corolla mauve, twisted, 2 Aug. 1949, 15993. Prov. Mersin, distr. Anamur (Cilicia Trachea) : Olucak Y. between Ermenek and Anamur, scree, stems \pm erect, corolla white, twisted, 18 Aug. 1949, 16334b. Prov. Niğde, distr. Ulukışla (Cilicia) : Bulgar Da., near Sari Tepe Y., scree, 2700 m., procumbent-ascending, fl. violet, 2 Sept. 1949, 16583 ; Bulgar Da., near Alihoca, ascending-erect, corolla violet, twisted through 180°, 3 Sept. 1949, 16534. Prov. Adana, distr. Karaisah (Cilicia) : Bulgar Da., between Pozanti and Meydan Y., stems procumbent-ascending, 1 Sept. 1949, 16585.

I have been able to examine what is evidently the holotype of *C. origanifolia* Lab. in the Webb Herbarium in Florence. This has Labillardière's original description attached to it, and agrees with the figure in his Ic. Pl. Syr. Rar. **4**, t. 9 (1812). But I have not seen the type

of *Satureia Lebillardieri* Briq. in Herb. Delessert ; nevertheless, I feel it must be considered conspecific with *Calamintha organifolia*.

The Taurus gatherings cited above shows how variable *C. organifolia* is, and that it is impossible to keep *C. florida* Boiss. specifically distinct from it. In Turkey the stamens are generally exerted and bent downwards, but there is a wide range of variation in indumentum, habit (decumbent forms predominate, but populations with ascending stems occur) and in the form of the bracts and calycine teeth. The only fairly close correlation between these variables seems to be that between woolly indumentum and broad bracts. As with *Sideritis libanotica* Lab., individual populations are relatively uniform, so that the species is made up of a large number of local races. One of the most distinct of these is *Davis* 16334b from Cilicia Trachea ; this has an ascending-erect habit, woolly indumentum, obovate bracts and white flowers.

Calamintha tauricola P. H. Davis, sp. nov. (Sect. *Calamintha* (Mönch) Benth.).

Affinis *N. betulifoliae* Boiss. et Bal. sed foliis subtus crassinervis, floribus $\frac{1}{3}$ – $\frac{1}{2}$ minoribus, calyce brevior ad $\frac{1}{4}$ – $\frac{1}{3}$ bilabiato, corolla magis exserta inter alia recedit.

Planta perennis, saxatilis, valde suaveolens. *Caules* floriferi e basi indurato numerosi, simplices vel subramosi, decumbentes, 10–30 (40) cm. longi, tenues, vix quadrangulares, pilis brevissimis glandulosis et eglandulosis et pilis longis eglandulosis paucissimis ut folia vestiti. *Folia* ovato-elliptica, 10–25 mm. longa, 6–15 mm. lata, brevissime petiolata, internodiis breviora, breviter acuminata, basi late cuneata, superne utrinque \pm remote et argute 2–3-serrata, nervatura subtus prominente, nervis lateralibus utrinque \pm 4 ; floralia caulinis simillima sed sensim diminuta, paulo angustiora, calycibus duplo longiora. *Verticillastrae* 3–7-nata, remota, e cymis 1–3-floris breviter pedunculatis et breviter pedicellatis composita. *Bractee* lanceolatae, acuminatae, 3–4 mm. longae, pedicellis paulo longiores. *Bracteolae* bracteis simillimae sed duplo minores. *Calyx* 6.5–8 mm. longus, manifeste 11-nervosus, ad $\frac{1}{4}$ – $\frac{1}{3}$ bilabiatus, extus pilis brevissimis eglandulosis et glandulosis atque praesertim in parte inferiore pilis longis eglandulosis paucis commixtis vestitus, fauce laxe barbatus ; labium superius fere ultra medium in dentes late triangulares acuminatos ciliatos trifidum ; labium inferius superiori subaequilongum, in dentes triangulares manifeste acuminatos ciliatos bifidum. *Corolla* roseo-violacea, 17–20 mm. longa, ad $\frac{1}{4}$ – $\frac{1}{3}$ bilabiata, extus et intus pubescens ; labium superius inferiore duplo brevius, ad $\frac{1}{3}$ retusum ; labium inferius barbatum, trilobatum, lobo mediano orbiculare lateralibus late ovatis obtusissimis duplo longiore. *Stamina* anteriora posterioribus multo longiora. *Nuculae* sub-orbiculares, 1.5 mm. longae, 1.25 mm. latae, obtusae, laeves, pallide brunneae.—Floret Jul.–Aug.

Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ. between Sarivadi and Beşkuyu (between Ermenek and Anamur), 1500–1700 m., on rocks within the dominion of *Abies cilicia*, very aromatic, fl. violet, 16 Aug. 1949, *Davis* 16225 (*typus in Herb. Kew.*). Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Beşkuyu and Çamurlu Y. (between Ermenek and Anamur), 1900 m., fl. pink-violet, 17 Aug. 1949, 16281 (*forma in umbra crescens*).

Unlike *C. betulifolia* Boiss. et Bal. and *C. pamphylica* Boiss. et Heldr. ex Benth., which have a minty smell, *C. tauricola* smells strongly of a mixture of sweet apples and pineapple. Other characters, beyond those given in the diagnosis, to separate it from *C. betulifolia* are its more congested and fewer-flowered whorls, and the fewer leaf-serrations that are usually drawn out into a sharper point. Typical *C. betulifolia* has only been recorded to the East of *C. tauricola*; the former grows in the main Cilician Taurus massif and in the Amanus.

***Calamintha vulgaris* (L.) Druce** in Ann. Scot. Nat. Hist. 1906 : 224 (1906). (*Clinopodium vulgare* L., Sp. Pl. 587 : 1753).

Prov. Antalya, distr. Gebiz. (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 1500 m., 24 Jul. 1949, 15569 & 15518. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Gökçayır and Atlik Y., 1500 m., 26 Aug. 1949, 16449 ; Dildil Da., between Başkonuş and Huseyin Oluk Çe., 1800 m., 27 Aug. 1949, 16406.

***Dorystaechas hastata* Boiss. et Heldr.** apud Benth. in D.C., Prodr. 12, 261 (1848).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da., fl. white, 10 Jul. 1949, 15048 ; Tahtali Da. at Gürleyik Y., 1500 m., 9 Jul. 1949, 15123 ; between Ovacik (on Teke Da.) and Söğüt Cumasi Y. (near Calbali Da.), about 50 per cent. of the bushes setting fruit, 13 Jul. 1949, 15239.

In the field it was noticed that only about half of the bushes of this monotypic genus bore fruit, suggesting that the species is dioecious. Examination of rather limited dried material shows that in the form that does not fruit the stamens and style both appear to be fully developed, though the ovules and calyces fail to enlarge after flowering. In the sex form that fruits (evidently female) the gynoeceum is fully developed, but the stamens are partially aborted or absent ; the calyces and ovules enlarge after anthesis—a feature readily noted in the field. *Dorystaechas*, in fact, though morphologically gynodioecious, appears to be functionally dioecious, the morphologically hermaphrodite form being physiologically male.

***Lamium striatum* Sibth. et Sm., Fl. Gr. 6, 46 (1827) var. *striatum*.**

Prov. Isparta, distr. Sütcüler (Pisidia) : Dedegöl Da. at Dedegöl tarn, 2400 m., shady scree, fl. mauve-pink, 3 Aug. 1949, 16028.

var. ***minum* Boiss., Fl. Or. 4, 757 (1879).**

Prov. Antalya (Lycia) : Çalbali Da., 2000–2100 m., among shady rocks, fl. purplish pink, 14 Jul. 1949, 15281 ; distr. Gebiz (Pisidia), Bozburun Da. above Tozlu Çukur Y., foot of N. cliffs, 25 Jul. 1949, 15611.

var. ***reniforme* (Montbr. et Auch.) Boiss., Fl. Or. 4, 757 (1879).**

Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Çamurlu Y. and Olucak, 18 Jul. 1949, 16295.

f. inter typicum et var. ***minum* Boiss.**

Prov. Antalya (Lycia) : Çukur Ardiç Y. near Çalbali Da., 15 Jul. 1949, 15379.

I accept Boissier's circumscription of this species until the group can be revised.

Lycopus europaeus L., Sp. Pl. 21 (1753).

Prov. Konya, distr. Beyşehir (Isauria) : Hoyran, damp fields, fl. white, 5 Aug. 1949, 16112.

Marrubium astracanicum Jacq. subsp. **macrodon** (Bornm.) Davis, comb. et stat. nov. (*M. macrodon* Bornm. in Beih. Bot. Centr. **24** (2) 489 : 1909.)

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Taşlı Y. and Kozlu D. 1600 m., fl. violet, 27 Jul. 1929, 15726 (*forma foliis caulinis ovatis grosse et acute crenato-serratis a typo subspeciei differt*).

Bornmüller described his *M. macrodon* from material collected on Sultan Dağ in Phrygia (about 150 km. N. of Bozburun Da.), and compared it with *M. heterodon* (Benth.) Boiss. et Bal. on account of its long calyx-teeth. But it is so close to *M. astracanicum* Jacq. (including *M. kotschyi* Boiss. et Hoh.) that I find it necessary to treat it as a subspecies of that polymorphic denizen of Anatolia, Iraq and Persia. Another specimen that must also be referred to subsp. *macrodon* is *Sintenis 1565* from Paphlagonia (Mt. Bellorva near Tossia) ; the station is far distant from Bornmüller's original locality, but seems to have some floristic affinities with the Taurus : *Sintenis*, as a matter of fact, collected *M. heterodon* in the same area, although the species has been found elsewhere only in the Cilician Taurus.

The type of variation that occurs in the leaf-form and bract-indumentum of subsp. *macrodon* is repeated in *M. astracanicum*, *sensu stricto*. In the isotype of the subspecies at Kew the calyx-teeth are at least as long as the tube, but in *Davis 15726* and *Sintenis 1565* they are very slightly shorter. Forms of *M. astracanicum* with the teeth $\frac{1}{3}$ the length of the calyx, collected in the Cilician Taurus, are represented in the Kew Herbarium, and evidently link subsp. *macrodon* to the typical short-toothed form of the species.

Marrubium bourgaei Boiss., Fl. Or. **4**, 698 (1879) subsp. **bourgaei**.

Prov. Antalya (Lycia) : Çalbalı Da. 2000–2100 m., fl. whitish, 14 Jul. 1949, 15295 ; distr. Kemer, Tahtalı Da. at Gürleyik Y., 1400 m., 9 Jul. 1949, 15127.

M. bourgaei subsp. *bourgaei* is a constantly flavescent plant of fairly dwarf and slender habit. It is very variable : the leaves may be thin and rather narrowly obovate (as in *M. heterodon* Boiss. et Bal.), or they may be obovate-orbicular and of thicker texture due to more pannous indumentum. The indumentum of bracts and calyces varies from plumose with predominantly simple hairs (as in the type, and thereby recalling *M. heterodon*) to predominantly stellate, as in *M. globosum* Montbr. et Aucher subsp. *libanoticum* (Boiss.) Davis. The flowering stems are covered with tawny, largely stellate indumentum, but the slender sterile shoots bear a short, close, lanate covering of dirty white colour. *M. bourgaei* Boiss. subsp. *caricum* Davis (in Kew Bull. 1949 : 399) is a taller, more robust plant than the typical form of the species, with thicker, somewhat sericeous (though still flavescent) leaves and larger whorls. In habit it resembles the Pisidian forms of *M. globosum* enumerated below, but its longer, slightly spreading bracts with predominantly stellate indumentum show that the affinity of the Carian plant is with *M. bourgaei*.

Marrubium globosum Montbr. et Auch. apud Benth. in Ann. Sc. Nat. Bot. Ser. 2, **6**, 63 (1836) subsp. **globosum** (incl. *M. faucidentis* Boiss. et Bal. in Boiss., Diagn. Ser. 2. (4) 50 : 1859).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 1700 m., 24 Jul. 1949, 15576 ; Bozburun Da., between Taşlı Y. and Kozlu D., abundant, 25 Jul. 1949, 15733 ; Bozburun Da. near Tozlu Çukur Y., 24 Jul. 1949, 15584. Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da. at Taş Oluk Y., 2100 m., scree, 2 Aug. 1949, 16066 ; Dedegöl Da. at Oruz Gaz Y., 1 Aug. 1949, 15944—*plantae Pisidiae omnes bracteis brevioribus a typo M. faucidentis Boiss. et Bal. divergit*. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Gökçayır and Atlik Y., 1600 m. 26 Aug. 1949, 16452 (fruct.) ; Dildil Da. above Atlik Y., 1900 m., 27 Aug. 1949, 16429 (fruct.)—*plantae Amanii indumento calycis e pilis simplicibus et stellatis composito a typo M. faucidentis Boiss. et Bal. differt*.

subsp. **libanoticum** (Boiss.) Davis, comb. et stat. nov. (*M. libanoticum* Boiss., Diagn. Pl. Or. Ser. 1 (12) 73 : 1853.)

subsp. **micranthum** (Boiss. et Heldr.) Davis, comb. et stat. nov. (*M. micranthum* Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 449 : 1848.)

Prov. Konya, distr. Ermenek (Isauria) : Oyuklu Da. near Kaya Pinari Çe. (between Ermenek and Karaman), 1800–1900 m., 14 Aug. 1949, 16163 ; Ermenek, 1300–1400 m., 13 Aug. 1949, 16158 (*forma dentibus calycis villosissimi tubum aequantibus*).

f. inter subsp. **micranthum** (Boiss. et Heldr.) Davis et subsp. **globosum**.

Prov. Mersin, distr. Anamur (Cicilia Trachea) : between Beşkuyu and Çamurlu Y. (between Ermenek and Anamur), 1900 m., abundant on stony slopes, fl. white, 17 Aug. 1949, 16269.

The circumscription of several species in Sect. *Marrubium* Benth. Subsect. *Quinquidentata* Briq. presents considerable difficulties. There can have been few groups in which Boissier so narrowly interpreted the species in his Flora Orientalis. I have been able to examine several of these in the field, and must now take a wider view of *M. globosum* than that adopted by Boissier with less material at his disposal. Many forms play an important part in the alpine phytosociology of the Near East, being often dominant on the mountain sides,

M. globosum was originally described from Ak Dağ in Cappadocia. The isotype in the Kew Herbarium has narrowly obovate stem-leaves with the lamina twice as long as broad ; they are not excessively felted, and the gathering may possibly be a shade form. Later gatherings from Western Anatolia assigned to this species (Tmolus in Caria (Boiss.), Bey Dağ in Lycia (Pichler), etc.) have broader, obovate-orbicular stem-leaves with a much denser indumentum. Boreau's plant from Lycian Ak Dağ has narrower leaves than in the type, but the sericeous indumentum of the other forms. The closest match with the type is Bornm. 607 from the Ak Dağ near Amasya.

M. faucidens Boiss. et Bal. was based on material collected in a rather dried-up summer state near the Cilician Gates. I cannot distinguish the calyx-shape of *M. faucidens* from that of *M. globosum*, the main difference being in the calycine indumentum, which is less woolly in the former

plant. The habit of *M. faucidens* is that of the round-leaved, densely felted forms of *M. globosum* referred to in the preceding paragraph. Other specimens from the Cilician Taurus (*Siehe* 164 & 215, *Kotschy* 455 & 456) fall morphologically between *M. faucidens* and *M. globosum*, and the same applies to *Haradjian* 1698 from Akher [Ahir] Dağ near Maraş. There is, in fact, such an array of intermediate forms that I find it impossible to separate *M. faucidens* from the variable *M. globosum*, and am doubtful if even varietal rank should be assigned to it. I therefore take a rather wide view of subsp. *globosum*, and include under it not only *M. faucidens* but also all my Pisidian gatherings, which differ from the type of *M. faucidens* in their shorter bracts. When more material is available from the *locus classicus* of *M. globosum* it may be desirable to name some geographical races that are included here under the typical subspecies. The species is gynodioecious.

I have also felt obliged to reduce *M. libanoticum* Boiss. and *M. micranthum* Poiss. et Heldr. to subspecies of *M. globosum*. My specimens from the Amanus (cited above under subsp. *globosum*), and also *Haradjian* 3834 from the same mountain, though resembling the type of *M. faucidens*, have a substellate indumentum on the calyx which links them on to *M. libanoticum*—a plant which Boissier distinguished from *M. globosum* by the stellate nature of its calycine indumentum. Even in the Lebanon, stellate indumentum is not constant in *M. libanoticum*; specimens collected there by Post, Bornmüller and myself, and even by Boissier (who cited them under the original description) have long simple hairs on the calyx mixed with the stellate ones.

M. micranthum is a small plant, especially in leaf, and the lowest whorls are normally peduncled. But in *Davis* 16269 the whorls are sessile, and the plants are evidently intermediate between *M. micranthum* and the Pisidian gatherings of subsp. *globosum*. I have therefore reduced *M. micranthum* to subspecific rank. In the Isaurian Taurus this subspecies replaces subsp. *globosum* which reappears to East and West of it, just as *Sideritis libanotica* Lab. subsp. *violascens* (Davis) Davis replaces subsp. *linearis* in the same area. It might be noted that the length and posture of the calyx-teeth varies considerably in *M. globosum* subsp. *micranthum*.

In its very appressed sericeous indumentum the Pisidian gatherings of *M. globosum* bear a resemblance to *M. rotundifolium* Boiss. from Lycia. The latter, however, can be distinguished from all forms of *M. globosum* as circumscribed here by its large floral leaves that are broadest in the middle (or even below it) instead of above it. The only other species that comes very close to *M. globosum* is *M. bourgaei* (see above); part of *Pichler* 539 (from Bey Dağ in Lycia) may consist of a hybrid between these two species, both of which Pichler collected in the same locality.

A key is given below to the species most closely allied to *M. globosum*, including closely related Balkan forms. The distribution given is for material examined in the Kew Herbarium. I have excluded from the key *M. friwaldskyanum* Boiss., treated by Hayek (*Prodr. Fl. Pen. Balc.* 2, 254) as a variety of *M. velutinum* Sibth. et Smith; in my view it is well separated from the latter and from other species in this complex, being a plant of much coarser habit.

*Key to the species and subspecies closely related to M. globosum**Montbr. et Auch.*

Calyx teeth slightly longer than the tube, overtopping the corolla (Greece).
M. velutinum Sibth. et Sm.

Calyx teeth shorter than the tube and corolla :

Bracts at least as long as the calyx-tube, slightly spreading :

Calyx teeth patent (Peloponnesus, Albania (var. *albanicum* Rech. fil.)
M. cyllenaeum Boiss. et Heldr.)

Calyx teeth usually erect :

Calycine teeth unequal, the longer pair nearly as long as the tube
 (Cilicia, Paphlagonia) . . . *M. heterodon* (Benth.) Boiss. et Bal.

Calycine teeth subequal, considerably shorter than the tube :

Stem-indumentum pannous ; leaves silvery (Thessaly) . . .
M. thessalum Boiss. et Heldr.

Stem-indumentum stellate ; leaves flavescent :

Leaves not shining ; height 15–30 cm. (Lycia)
M. bourgaei Boiss. subsp. *bourgaei*.

Leaves shining ; height 30–40 cm. (Caria)
M. bourgaei Boiss. subsp. *caricum* Davis.

Bracts shorter than the calyx tube, appressed :

Lamina of the floral leaves widest above the middle, 0.8–2.0 cm.
 long, petioled :

Lowest whorls pedunculate (Isauria)
M. globosum Montbr. et Auch.
 subsp. *micranthum* (Boiss. et Heldr.)
 Davis.

All whorls sessile :

Indumentum silvery ; calyx-indumentum woolly or hirsute,
 rarely substellate ; stems 15–35 (40) cm. tall (Cappadocia,
 Amanus, Cilicia, Pisidia, Lycia, Caria)

M. globosum Montbr. et Auch. subsp. *globosum*

Indumentum flavescent (excl. var. *hermene* Boiss.—*non vidi*) ;
 calyx indumentum usually stellate ; stems 12–25 cm. tall
 (Lebanon) *M. globosum* Montbr. et Auch.
 subsp. *libanoticum* (Boiss.) Davis.

Lamina of the floral leaves widest above the middle, 2–3, 5 cm. long,
 subsessile (Lycia) *M. rotundifolium* Boiss.

Marrubium heterodon (Benth.) Boiss. et Bal., in Boiss., Diagn. Ser. 2
 (4) 52 (1859).

Prov. Adana, distr. Karaisah (Cilicia) : Bulgar Da., near Meydan Y.
 above Pozanti, 2400 m., 1 Sept. 1949, 16591 & 16545.

Marrubium lutescens Boiss., Diagn. Ser. 1 (5) 34 (1844).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., below Oruz
 Gaz Y., on limestone, scarce, 1 Aug. 1949, 15902.

In its only slightly flavescent indumentum this gathering matches
 Phrygian material of the species (Sultan Da., *Bornm.* 5469 ; Mourad Da.,
Bal. 1183).

Marrubium parviflorum Fischer et Meyer, Ind. Petrop. 1, 33 (1835).

Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp. Da., fl. white, 28 Jul. 1949, 15795 (*forma verticillastris inter se congestis*).

Mentha L.—I list my gatherings at the broad specific level only, pending more critical determination by Dr. F. Petrak.

Mentha aquatica L., Sp. Pl. 576 (1753).

Prov. Antalya, distr. Elmali (Lycia) : Kara G. near Yuva, 1000 m., marshes (♂) 7 Aug. 1947, 13930. Prov. Konya, distr. Beyşehir (Isauria) : Hoyran (♂), 5 Aug. 1949, 16116.

Mentha longifolia (L.) Huds., Fl. Angl. ed. 1, 221 (1762).

Prov. Ankara (Galatia) : Beynam, by stream, (♀), 5 Jul. 1947, 13029. Prov. Muğla, distr. Fethiye (Lycia) : Girdev Da. 2200 m., (♂, ♀), 3 Aug. 1947, 13784 ; distr. Köyceğiz (Caria), Ağla on Sandras Da., 600 m., by water, fl. mauve (♂), 25 Jul. 1947, 13634. Prov. Antalya (Lycia) : Çalbalı Da. at Tepedelen Y., (♂, ♀), 13 Jul. 1949, 15254 ; distr. Kemer (Lycia), Tahtalı Da. above Kuzdere Y., (♀), 17 Aug. 1947, 14086 ; distr. Alanya (Isauria), Eğri G. at N. foot of Geyik Da., 2000 m., near stream, (♂), 1 Sept. 1947, 14666, and in Kargı Ç. a valley near spring called Taşatan, 900 m., (♀), 25 Aug. 1947, 14423. Prov. Isparta, distr. Sütçüler (Pisidia) : between Tota Beyli Y. (on Kuyucuk Da.) and Daribükü, on metamorphic soils, fl. lilac (♂), 30 Jul. 1949, 15889. Prov. Konya (Lycaonia) : between Konya and Kaşınan, fl. violet (♀), 7 Sept. 1947, 14773 ; distr. Beyşehir (Isauria), Hoyran, wet fields, (♂), 5 Aug. 1949, 16105 ; distr. Bozkır (Isauria), Bozkır vadisi, by river, (♂), 7 Sept. 1949, 16615 ; distr. Ermenek (Cilicia Trachea), Sarıvadi, (♂), 15 Aug. 1949, 16215. Prov. Mersin, distr. Anamur (Cilicia Trachea) : Olucak Y. between Ermenek and Anamur, (♂, ♀), 18 Aug. 1949, 16332. Prov. Adana, distr. Bahçe (Amanus) : Haruniye, in damp hedge, 400 m., fl. lavender (♂), 26 Aug. 1949, 16372 ; Dildil Da., between Başkonuş Y. and Hüseyin Oluk Çe., steep gully, fl. lavender (♀), 27 Aug. 1949, 16395.

Though some specimens approach *M. microphylla* C. Koch either in leaf-form or inflorescence, all have the simple hairs characteristic of *M. longifolia* (L.) Huds. It is certainly the commonest *Mentha* in Southern Anatolia.

Mentha pulegium L., Sp. Pl. 577 (1753).

Prov. Denizli (Caria) : Taş Ocağı near Denizli, fl. pale lilac, 13 Jul. 1947, 13270. Prov. Antalya, distr. Elmali (Lycia) : Kara G. near Yuva, fallow fields, fl. violet-purple, 1000 m., 7 Aug. 1947, 13922 ; *ibid.*, 13925 (*forma floribus albis, cum typo crescens*).

Mentha rotundifolia (L.) Huds., Fl. Angl. ed. 1, 221 (1762).

Prov. Denizli (Caria) : Taş Ocağı near Denizli, fl. white (♀), 13 Jul. 1947, 13239. Rare in the Orient.

Micromeria amana Rech. fil. in Svensk. Bot. Tidskr. 43 (1) 42 (1949).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. near Haruniye, on outcrops of metamorphic rocks, 26 Jul. 1949, 16377 (*locus classicus*).

Micromeria aff. cristatae (Hoppe) Gris., Spic. Fl. Rum et Bithyn. 2, 122 (1844).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., rocks, 24 Jul. 1949, 15561.

Micromeria congesta (Boiss. et Hausskn.) Boiss., Fl. Or. **4**, 575, (1879). (*M. shepardii* (Post) Post in Bull. Herb. Boiss. Ser. 1, **1**, 405 : 1893.)

I previously suggested (in Kew Bull. 1949 : 111) that *M. shepardii* (Post) Post was very closely related to *M. congesta* (Boiss. et Hausskn.) Boiss. Since then I have been able to examine the type of *M. shepardii*, and consider that species conspecific with *M. congesta*. It is worth noting that the type of *M. shepardii*, collected at Aintab, matches very well *Sintenisi* 1403 from Orfa (Urfa) in Mesopotamia, determined as *M. congesta* by Stapf. In the type of *M. shepardii*, and in Post's specimens of that plant from El Weshen in the Syrian desert, the calyx is nearly naked at the throat, but in Post's gathering from Karyatein it is slightly bearded. The last two collections of *M. shepardii* are of dwarfer stature than the type, and recall *M. libanotica* Boiss., which, however, is an alpine species having more slender purplish calyces with a more or less patent indumentum and a villous throat.

It may prove necessary to reduce *M. congesta* to a subsp. of *M. fruticosa* (L.) Druce, but, with the material available, the former's distinctive inflorescence and acute nutlets do not seem to justify that course. *M. congesta* differs phytosociologically from *M. fruticosa* (L.) Druce, *sensu lato* ; the first belongs to the Irano-Turanian element, the second to the Mediterranean and Pontic regions.

Micromeria dolichodonta P. H. Davis, sp. nov. (Sect. *Pseudomelissa* Benth.).

Affinis *M. pulegio* Benth. sed indumento dense et brevissime velutino-tomentoso, foliis integris brevissime petiolatis canis haud punctatis ut videtur, nuculis apice acutis apiculatis inter alia facile distinguenda.

Planta perennis, cana, saxatilis, basi indurata turionibus parvis praedita. *Indumentum* caulium et foliorum et pedunculorum et calycum dense sed brevissime et subappresse velutino-tomentosum. *Caules* floriferi erecti, simplices vel superne sparse ramosi, subquadrangulares, 30–50 cm. alti, prope basin 1.5–2.0 mm. lati. *Folia* late ovata, obtusa, plana, firma, basi rotundato-truncata, 1.5–2.0 cm. longa, 1–1.4 cm. lata, brevissime petiolata, ut videtur haud punctata, nervis lateralibus utrinque 3–5 vix prominetibus subtus praedita. *Folia floralia* inferiora caulinis simillima sed basi minus truncata, superiora elliptico-ovata sensim diminuta, summa valde reducta lanceolata vix 2 mm. longa. *Verticillastra* 10–18-nata, distantia, e cymis 5–15-floris sublaxis dichtomo-pedunculatis composita, racemum 10–20 cm. longum, 1–2 cm. latum valde interruptum formantia. *Bracteae* lanceolatae, 1–1.5 mm. longae. *Calyx* breviter tubulosus, vix glandulosus, 13-nervosus, 2–2.5 mm. longus, intus piloso-annulatus, extus imberbis, vix bilabiatus ad medium in dentes lanceolato-subulatos rectos inaequales (binos anteriores posteriore subduplo longiores) obliquiter fissus. *Corolla* 6 mm. longa, albida, extus pubescens, ad $\frac{2}{3}$ bilabiata, tubo supra medium ampliato ; labium superius late ovatum, retusum ; labium inferius trilobatum, lilacino-maculatum, superius subaequans, 3.5–4.0 mm. latum, lobis lateralibus obtusissime oblongo-ovatis lobo mediano late cochleare 1.5 mm. longo vix retuso sub-breviori-

bus. *Nux* vix 1 mm. longa, latitudine subduplo longior, papillis oblongis superne munita, fusca, apice acuta apiculata.—Floret Aug.

Prov. Mersin, distr. Gülnar (Cilicia Trachea) : Kizilyokuş D. near Bozağaç (S. of Gülnar), flat and sloping limestone rocks, stems simple or few-branched, erect, fl. whitish with lilac spots on lower lip, 20 Aug. 1949, *Davis 16356* (*typus in Herb. Kew.*).

M. dolichodonta is of considerable geographical interest. On account of its calyx-shape, it appears to be most closely related to *M. pulegium* Benth., known only from Eastern Europe and the North Balkans. From *M. pulegium* it can be distinguished at a glance by its dense, short, grey indumentum and short-petioled, entire leaves. From the Balkan *M. dalmatica* Benth. it is further distinguished by the ring of hairs inside the calyx. *M. dalmatica* should perhaps include *M. bulgarica* (Vel.) Hayek as a geographical race.

In its short grey indumentum *M. dolichodonta* resembles *M. fruticosa* (L.) Druce, *sensu lato* (see below), but differs not only in its broader leaves with much shorter petioles, and in its longer lanceolate bracts, but also in the very different form of its oblique, long-toothed calyx which finds no counterpart in any West Asiatic species of *Micromeria*.

The new species was one of four (including *Sideritis brevidens* Davis described below) collected when the post-bus mercifully broke down on the road between Anamur and Silifke. The area would surely repay more leisurely exploration.

Micromeria fruticosa (L.) Druce in Rep. Bot. Exch. Cl. Brit. Isles **3**, 421 (1914), *sensu lato*.

The Iberian *M. fruticosa* (L.) Druce (*M. marifolia* Benth., *pro parte occidentale*) so closely resembles some N. Anatolian specimens of *M. serpyllifolia* M.B. *s. stricto* that I have reduced the latter to a subspecies of *M. fruticosa*. This has led me to assign similar rank to *M. barbata* Boiss. et Kotschy (reduced by Boissier in *Flora Orientalis* to a variety of *M. serpyllifolia*), and also to the S. Anatolian race previously included in *M. serpyllifolia s. stricto*, but distinguished here as *M. fruticosa* subsp. *brachycalyx* Davis.

The distribution of *S. fruticosa s. lato* is peculiar : subsp. *fruticosa* grows in the Iberian Peninsula and N. Italy ; subsp. *serpyllifolia* jumps from the Crimea and N.E. Anatolia to Albania ; subsp. *brachycalyx*, equally disrupted, is found at lower latitudes than the latter, being a native of S. Anatolia and Sicily ; and subsp. *barbata*, still further south, is endemic to Lebanon and Palestine. Such a distribution suggests fragmentation of a once more continuous area, and it would seem that the species is a fairly old one. The four subspecies, regarded as entities, show an increase in the bearding of the calyx from North to South.

The records cited below are only of specimens examined. I have seen no material of the plant described as *M. marifolia* Benth. var. *italica* Huter, endemic to Manfredonia in Italy, and have therefore omitted it from my key to the races of *M. fruticosa*.

subsp. ***fruticosa*** (*Melissa fruticosa* L., Sp. Pl. 593 : 1753. *Micromeria marifolia* Benth., Lab. 382 : 1834, *ex parte ad specimina lusitanica et hispanica*. *Salureia fruticosa* (L.) Bég. var. *typica* Fiori, Nuova Fl. Analit. Ital. **2**, 455 : 1926.)

Indumentum canescens. *Caules* 30–50 cm. alti, ramosi. *Lamina* 0·8–

1.3 cm. longa, latitudine circ. 2.5-3-plo longior, pilis brevissimis appressissimis puncta haud occultantibus. *Cymae* 7-15-florae, inter se remotiusculae, racemum interruptum formantes. *Calyx* subconico-cylindricus, statu florifero 2-2.5 mm. longus, ad $\frac{1}{5}$ in dentes fissus pilis appressissimis vestitus, fauce barbatus. *Nuculae* apice obtusiusculae.

SPAIN. Valencia : Sierra de Espedan, 1500 m., *Reverchon* 686 ; in fiss. rup. ad Valentiam, 1886, *Pau* ; ad muros theatri antiqui Saguntini prope Murviedro copiose, *Willkomm* 486. Espagne, 1818, *Dufour* (*forma calyce faucibus sparse barbatulo*).

PORTUGAL. Lisbon, 1832, *Martius*.

This subspecies (as *Satureia fruticosa* (L.) Bég. var. *typica* Fiori) has also been recorded by Fiori (*l.c. supra*) from Trieste in N. Italy.

subsp. **serpyllifolia** (M.B.) Davis, comb. et stat. nov. (*Nepeta serpyllifolia* M.B., Fl. Taurico-Caucasia, **2**, 40 (1808). *Micromeria serpyllifolia* (M.B.) Boiss., Fl. Cr. **4**, 547 : 1879, *solum ad plantas ex Crimea*.)

Indumentum canum. *Caules* 15-40 cm. alti, ramosi. *Lamina* (8) 10-15 mm. longa, latitudine circ. 2-2.5-plo longior, subtus pilis densis puncta occultantibus. *Cymae* 7-15-florae, inter se subremotae, racemum interruptum formantes. *Calyx* obconico-cylindricus, statu florifero 2-2.75 mm. longus, ad $\frac{1}{5}$ - $\frac{1}{4}$ in dentes fissus, pilis appressissimis vestitus, fauce haud vel sparsissime barbatulus. *Nuculae* apice obtusiusculae.

CRIMEA. Tauria, *Ledebour*.

N.E. ANATOLIA. Armenia, *Calvert & J. Zohrab* 751. Erzerum, *M. Zorab*. Kozan Ormanlari [Prov. Kars?], *J. Karakan* 347.

ALBANIA (sine loco), *Grisebach*.

I have not seen Bieberstein's Crimean type of this plant, only Ledebour's gathering from the same area. As the latter is fragmentary, I have drawn up the description mainly from Turkish material.

subsp. **barbata** (Boiss. et Kotschy) Davis, comb. et stat. nov. (*Micromeria barbata* Boiss. et Kotschy in Boiss., Diagn. Ser 2 (4) 14 : 1859.)

Indumentum valde canum. *Caules* 30-60 cm. alti, divaricato-ramosi. *Lamina* 0.8-1.5 mm. longa, latitudine 2-plo longior, subtus vix punctata. *Cymae* 7-30-florae, superiores inter se sub-congestae capitulum ovatum formantes. *Calyx* obconico-cylindricus, 2-2.75 longus ad $\frac{1}{5}$ in dentes fissus, fauce valde barbatus, pilis subappressis praeditus. *Nuculae* apice subapiculatae.

LEBANON. Ad Bscherre et circa Cedretum, *Kotschy* 342. Bischmette [Bscherre?], *Ehrenberg* 111. Saida, 30 Aug. 1853, *Blanche*. "Syria", *Hooker & Hanbury*.

PALESTINE. Mt. Tabor, *Gaillardot* 726. Nazareth, *Meyers & Dinsmore* 4816 ; *ibid.*, *Bové* 420 ; *ibid.*, *Davis*. Emmaus (near Jerusalem), *Meyers & Dinsmore* 2816b ; *ibid.*, *Meyers & Dinsmore* 1847. El Bussah, 1863-4, *Lowne*.

subsp. **brachycalyx** P. H. Davis, subsp. nov. (*Micromeria serpyllifolia* (M.B.) Boiss., Fl. Or. **4**, 547 : 1879, *solum ex monte Tauro*.)

A subsp. *fruticosa* lamina foliorum subtus vix evidenter punctata, calyce breviori turbinato-obconico fauce barbato, nuculis apice subapiculatis differt.

Indumentum valde canum. *Caules* 20–60 cm. alti, simplices vel ramosi. *Lamina* 0.8–1.5 cm. longa, latitudine 2–2.5-plo longior, subtus vix evidentur punctata. *Cymae* 7–30-florae, inter se subremotae manifeste pedunculatae et patentes, vel congestae et vix pedunculatae, racemum interruptum formantes. *Calyx* turbinato-obconicus, statu florifero 1.5–2 mm. longus, ad $\frac{1}{5}$ – $\frac{1}{4}$ in dentes fissus, pilis appressissimis vestitus, fauce barbatus. *Nuculae* apice subapiculatae.

S. ANATOLIA. Prov. Mersin/Adana (Cilicia) : Portes Ciliciennes, *Bal.* 538 (*typus* in *Herb. Kew.*) ; *ibid.*, 31 Aug. 1949, *Davis* 16469 ; Güllek Gale, 1400 m., *Siehe* 660 ; Bulgar Da., ad fontes vallis Pongar Su Nedere, 1500 m., *Kotschy* 94, 276 & 335. Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da. near Taşlı Y., 1700 m., rocks, fl. pale lilac—used for tea, and collected for me by a peasant—26 Jul. 1949, *Davis* 15602. Prov. Antakya (Amanus) : Seleucia, *Boiss.* Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., above Atlik Y., 2100 m., very rare, fl. white with mauve spotting on lower lip, 27 Aug. 1949, *Davis* 16426.

SICILY. Palermo, *Gandoger* 294.

As circumscribed here, subsp. *brachycalyx* shows considerable variation in the density of its cymes ; in the type gathering (as in the Sicilian material) the latter are many-flowered and spreading. There is also variation in the size of the corolla. But large and small corollas are not present in the same gatherings, nor are the stamens anything but well developed even in the small-flowered forms, so that this phenomenon does not appear to be due to gynodioecism. Subsp. *brachycalyx* grows at higher altitudes in the Taurus than subsp. *barbata* does in Palestine ; the latter is often co-dominant on flat rock-outcrops with *Varthemia iphionoides* Boiss. et Bal.

Key to the subspecies of Micromeria fruticosa (L.) Druce.

Cymes all more or less distant, forming a subcylindrical raceme ; calyx covered with very appressed hairs, at the throat naked or bearded :

Calyx bearded at the throat :

Calyx 2–2.5 mm. long, subconical-cylindrical ; leaves punctate below *fruticosa*

Calyx 1.5–2 mm. long, turbinate-subconical ; leaves scarcely punctate below *brachycalyx* Davis.

Calyx not bearded at the throat, or scarcely so *serpyllifolia* (M.B.) Davis.

Upper cymes congested into an ovate head ; calyx covered with somewhat appressed hairs, at the throat very strongly bearded *barbata* (Boiss. et Kotschy) Davis.

Micromeria graeca (L.) Benth., Lab. Gen. et Sp. 373 (1834).

Prov. Antalya, distr. Kemer (Lycia) : Kesme Boğ. near Kemer, 8 Jul. 1949, 15418 ; Gönük, 7 Jul. 1949, 15023 ; Teke Da. near Ovacik, fl. ± pink, 12 Jul. 1949, 15220.

Micromeria myrtifolia Boiss. et Hohen in Boiss., Diagn. Ser. 1, (5) 19 (1844).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da. at Kuzdere Y., 8 Jul. 1949, 15139 ; distr. Gebiz (Pisidia), above Kuzdere (in Kozlu D.) N. of Bozburun Da., 1100–1200 m., stony slopes in *Pinus brutia* forest, 28 Jul. 1949, 15845.

Nepeta amani Post in Bull. Herb. Boiss. Ser. 1, **1**, 29 (1893).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., 1800 m., steep gully, 27 Aug. 1949 *16380b*—collected with *N. cilicia* Boiss. var. *cilicia*. *Det. e descr.*

The relationship of *N. amani* Post and *N. aristata* Boiss. et Kotschy to each other and to *N. cilicia* Boiss. requires investigation.

Nepeta cadmea Boiss., Diagn. Ser. 1 (5) 21 (1844).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da. at Kuzdere Y., 900 m., 8 Jul. 1949, *15136* ; distr. Gebiz (Pisidia), between Taşlı Y. and Kozlu D., rocky slopes, fl. white, 27 Jul. 1949, *15729*. Prov. Isparta, distr. Sütçüler (Isauria) : Dedegöl Da., between Selköşe and Oruz Gaz Y., metamorphic soils, fl. white, 1 Aug. 1949, *15910*.

Having collected good material of *N. cadmea* and further examined *N. italica* L. and its close allies, I feel that the specific rank of *N. cadmea* should be maintained. Although the form of the calyx-teeth and size of the whorls (used as *differentiae* by Boissier) do not hold as distinguishing characters, the long, subulate, somewhat spreading bracts mark it off from *N. italica* as circumscribed below.

Nepeta caesarea Boiss., Fl. Or. **4**, 655 (1879).

Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ., between Sarivadi and Beşkuyu, rocky slopes, fl. purplish pink, 16 Aug. 1949, *16235*. Prov. Niğde, distr. Ulukışla (Cilicia) : near Alihoca at N. foot of Bulgar Da., 1200–1300 m., 3 Sept. 1949, *16520*.

Nepeta cilicia Boiss. apud Benth. in DC., Prodr. **12**, 388 (1848).

Examination of fairly abundant material of this variable species has led me to recognise the varieties described below ; one of these is based on *N. pycnantha* Benth. that Boissier reduced to a synonym of *N. cilicia* Boiss., though it has since been considered a species by Briquet (in Ann. Conserv. Jard. Bot. Genève, 1898, p. 106). The precise nature of these forms is not yet clear, so that I have preferred to classify them under the non-committal term *varietas* until they can be studied in the field. They appear to occupy equiformal progressive areas with the Cilician Taurus as their centre. Intermediates have been found in Cilicia and Isauria between var. *cilicia* (the most widespread form) and var. *pycnantha* ; but on the whole these two varieties show, like the very restricted var. *brevidens*, a rather close correlation of small distinguishing characters, especially with regard to the number of flowers in the whorl, and the size, form and indumentum of the calyx, so that most gatherings can be assigned to one or other of these three varieties. I have cited below all the material that I have seen of *N. cilicia*, *sensu lato*, but unfortunately I have not been able to examine the type of var. *pisidica* (Boiss. et Heldr.) Boiss.

var. **cilicia** (*N. andrica* Boiss. et Heldr.—*forma nuculis sub-monstruosis*.)

Lamina 2–4 cm. longa, basi cordata. *Inflorescentia* 5–11 (14) cm. longa. *Verticillastra* 3–6-nata, e cymis plerumque 3–7-floris composita. *Calyx* statu florifero 7–8 (10) mm. longus, breviter hispidulus et saepe etiam papillosus, ad $\frac{1}{4}$ vel prope ad $\frac{1}{3}$ in dentes anguste triangulares sub-acuminatos fissus. *Corolla* 2.5–2.7 cm. longa.

ANATOLIA. Prov. Denizli, distr. Acipayam (Caria) : Boz Da. above

Geyran Y., 1500–1670 m., 16 Jul. 1947, *Davis 13392, 13420, 13436*. Prov. Antalya distr. Gebiz (Pisidia) : Bozburun Da. at Kuruca Ov., 1800 m., rocks, much grazed, fl. violet-blue, 25 Jul. 1949, *Davis 15694* ; Bozburun Da., between Taşlı Y. and Kozlu D., 1600 m., among rocks, much grazed, 27 Jul. 1949, *Davis 15767*. Prov. Antalya, distr. Alanya (Isauria) : in cacuminibus montis Gheidagh Isaurici, 1900 m., 1845, *Heldreich (typus N. andricae Boiss. et Heldr.)* Prov. Mersin/Adana (Cilicia) : in monte Tauro, *Kotschy 460 pro parte (typus in Herb. Boiss. ; isotypus in Herb. Kew. !)* ; Bulgar Magara, 2400 m., *Kotschy* ; près du défilé du Portes Ciliciennes, *Balansa 543* ; Cilicia, *Siehe 181*. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe. 1800 m., steep gulley with *N. amani*, 27 Aug. 1949, *Davis 16380a* ; Dildil Da. above Atlik Y., 2000 m., 27 Aug. 1949, *Davis 16420*.

N. LEBANON. Above Sir, 1400 m., 16 June 1943, *Davis 6362* ; in declivitatibus supra Ehden in Cedreto "Scherbin", 1700–1800 m., 1 Jul. 1910, *Bornm. 12310*.

W. SYRIA. In cacumine Hermonis, 1846, *Boissier* ; Hermon, 1900 m., 1863–4, *B. T. Lowne* ; in fiss. rupestr. summis mont. Garbi, 1600 m. [near Zebdani] 1855, *Kotschy 29* ; West of Ein en Sur above Bludan, 2200 m., *Davis 9878*.

var. **pyncnantha** (*Benth.*) *Davis*, comb. et stat. nov. (*N. pyncnantha* *Benth.* in DC. Prodr. **12**, 388 : 1848.)

Lamina 3–7 cm. longa. *Inflorescentia* 10–20 cm. longa. *Verticillastra* 5–10-nata, e cymis 5–15-floris composita. *Calyx* statu florifero 9–10 mm. longus, papillosus, vix hispidulus, prope ad $\frac{1}{3}$ in dentes triangulari-lanceolatos acuminatos fissus. *Corolla* 2.5–3.0 cm. longa.

ANATOLIA. Prov. Mersin/Adana (Cilicia) : in monte Tauro, *Kotschy 460 pro parte (typus in Herb. DC., isotypus in Herb. Kew.) ibid., Kotschy 5, 7, 12, 13 ; ibid., Balansa 543* ; Burucik, Gilbe Kur, 1300 m., *E. K. Balls 1261*. Prov. Maraş : Akher Da., 1900 m., *Haradjian 1588* ; region d'Hassan Veyli, 1300–1700 m., *Haradjian 2306*.

LEBANON. Bisshere [Bscherre], *Ehrenberg 331*.

inter var. **ciliciam** et var. **pyncnantham** (*Benth.*) *Davis*.

ANATOLIA. Prov. Isparta, distr. Sütçüler (Isauria) : Dedegöl Da., near the cirque Aniçi, rocks, 2100 m., 2 Aug. 1949, *Davis 16064* ; Dedegöl Da. at Oruz Gaz Y., 1 Aug. 1949, *Davis 15933*. Prov. Mersin (Cilicia) : Durnas Y. uber Fundukbunar, 1600 m., *Siehe 295*.

var. **brevidens** *P. H. Davis*, var. nov.

Lamina 1.5–3 cm. longa, basi cordata vel truncata. *Inflorescentia* 4–10 cm. longa. *Verticillastra* 4–7-nata, e cymis 3–5-floris composita. *Calyx* statu florifero 7 mm. longus, hispidulus, ad $\frac{1}{4}$ – $\frac{1}{3}$ in dentes triangulares acutos fissus. *Corolla* 2.3–2.7 cm. longa.

ANATOLIA. Prov. Mersin/Adana (Cilicia) : Cilicia, *Siehe 181 (typus in Herb. Kew.)* ; Taurus, 2400 m., *Kotschy 191* ; Bulgar Da. *Kotschy 12, 111, 64 or 191* ; Bulgar Da., near Sari Tepe Y. above Alihoca, 2700 m., among rocks, fl. violet-blue, 2 Sept. 1949, *Davis 16582*.

This variety seems to grow at higher elevations than the others.

Nepeta decumbens P. H. Davis, sp. nov. (Sect. *Eunepeta* Boiss. Subsect. *Stenostegiae* Boiss.).

Species haec ut videtur affinis *N. mussini* Sprengel ex Henke et *N. phyllochlamydi* P. H. Davis ; a priore indumento patentiore, caulibus abbreviatis decumbentibus, bracteis acutissimis calycis tubum aequantibus, calyce tomentosulo-hirsuto in dentes longiores angustiores acutissimos fissis, corolla fere duplo minore, tubo e calyce paulo subexserto differt ; ab altera habitu magis decumbente, indumento minus denso, cymis subsessilibus congestis in verticillastra inter se \pm condensata dispositis, bracteis anguste lanceolato-linearibus acutissimis, corollae tubo longiore removitur.

Radix verticalis, crassa, lignosa. *Rami* perennes lignosi, procumbentes. *Caulis* floriferi decumbentes, 8–15 cm. longi, 1 mm. lati, breviter hirsutotomentosi, superne simplices vel subramosi, inferne turiones steriles elongatos emittentes. *Folia* breviter appresse tomentosa, \pm canescentia, petiolata ; lamina triangulari-ovata, basi cordata, 10–16 mm. longa, 8–13 mm. lata, utrinque 7–9-crenata (crenis obtusis), leviter rugulosa, petiolo subduplo longior, turionum sterilius densius vestita. *Folia floralia* caulinis simillima, sed brevissime petiolata, aliquantum diminuta, verticillastris sub-breviora nisi inferiora. *Verticillastra* 2–4-nata, 1–1.5 cm. lata, infima saepe remota, superiora inter se approximata vel condensata, e cymis coarctatis 3–7-floris vix pedunculatis vix pedicellatis composita. *Bractee* angustissime lanceolato-lineares, uninerviae, angustissime membranaceo-marginatae, ciliatae, tubum calycis \pm aequantes. *Calyx* 7–8 mm. longus, tubulosus, parum curvatus, ore paulo obliquus, extus tomentosulo-hirsutus, intus glaber, ad $\frac{2}{5}$ in dentes anguste lanceolatos acutissimos rectos vix membranaceo-marginatulos fissus. *Corolla* 12–13 mm. longa, tubo subexserto ; labium superius 2 mm. longum breviter bifido-retusum lobis obtusissimis ; labium inferius trilobatum, lobo mediano lobulato late orbiculare supra barbatulo, 3 mm. longo, prope 4 mm. lato, lobis lateralibus brevissimis obtusissimis. *Stamina* subexserta. *Nuculae* oblongae, 1.5 mm. longae, 0.75 mm. latae, obtusissimae, dense tuberculatae, nigrae.—Floret Jul.

Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Çamurlu Y. and Olucak Y. (between Ermenek and Anamur), 2000 m., among rocks, decumbent, 18 Aug. 1949, *Davis 16292* (*typus in Herb. Kew.*).

The material is limited, but the species is obviously a very distinct one. It holds an intermediate position, taxonomically and geographically, between *N. phyllochlamys* P. H. Davis (described below) and *N. mussini* Sprengel ex Henke. The calyx closely resembles that of *N. phyllochlamys*, but the latter's remarkable foliaceous bracts exclude it from Subsect. *Stenostegiae* in which *N. decumbens* must be placed.

N. italica L., Sp. Pl. 571 (1753), incl. *N. leucostegia* Boiss. et Heldr. in Boiss., Diagn. Ser. 1 (12) 62 : 1853.

Prov. Antalya (distr. Lycia) : Çalbalı Da., near Çukur Ardiç Y., rocky slopes, 15 Jul. 1949, 15391 ; distr. Gebiz (Pisidia), Bozburun Da., between Taşlı Y. and Kozlu D., rocky slopes facing N., fl. white, 27 Jul. 1949, 15730. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. near Atlik Y., 1700–1800 m., fl. white shaded with pale lemon yellow, 26 Aug. 1949, 16361.

I find myself unable to keep *N. leucostegia* Boiss. et Heldr. separate from *N. italica* L. Boissier's conception of *N. italica* was an unjustifiably personal one. The holotype of that species in the Linnean herbarium is intermediate between the part of the original type-series of *N. leucostegia* collected by Kotschy, and an extreme form of *N. italica* with long-acuminate bracts and calyx teeth that Boissier in his *Flora Orientalis* appears to have considered typical of that species. The Linnean specimen has lanceolate or elliptical-lanceolate bracts that are shortly spinulose-acuminate, pruinose, ciliate, appressed, and up to 1.75 mm. broad; their white membranous margin is, as in *N. leucostegia*, well-developed, being nearly as wide as the green part. The calyx-teeth are linear-lanceolate, and are *not* acuminate. There are 12 whorls on the main stem, and only the top 3 are touching; the lower ones are 2.0-3.5 cm. apart, and 17 mm. broad (excluding the corollas).

I have been unable to match the holotype of *N. italica* really closely with any specimen in the Kew Herbarium from the Orient, to which Boissier considered it confined. Fiori (*Nuova Fl. Anal. Ital.* **2**, 416 : 1926) records it from Italy, whence Linnaeus (*Sp. Pl.* 571 : 1753) believed it came; but I have seen no specimens from there.

N. italica is evidently a very variable species, and although local races undoubtedly occur and may enable it to be divided into several confluent infraspecific taxa, I am not attempting to do so here. My Pisidian gathering (15730) resembles very closely the part of the original type-series of *N. leucostegia* collected by Heldreich near Eğridir, but the latter plant is connected in Turkey by numerous intermediate forms to Boissier's conception of "typical" *N. italica*. Only on mountains that are well isolated have forms differentiated that do not usually merge into those of adjacent areas. In the Amanus and Mount Cassius, for instance, the species is represented by a race whose lanceolate bracts are almost devoid of a membranous margin and are drawn out into a long spinulose point only slightly shorter than the corolla (e.g. *Davis 16361*). A rather similar form (*Post 547, 2119*) occurs in the Lebanon, where, however, the species is very variable.

In Euboea *N. dirphyia* Heldr., and in Cyprus *N. troodi* Holmboe, may well have been derived from the polymorphic *N. italica*, owing to complete geographical isolation. They show little variation compared with *N. italica* on the mainland, which consists, like *Sideritis libanotica* Lab., of a mosaic of intergrading local races. I have, however, kept the mainland *N. cadmea* Boiss. and *N. sulfuriflora* P. H. Davis specifically distinct from the closely related *N. italica*, since I have seen no material that closely links them to the latter.

***Nepeta nuda* L. subsp. *albiflora* Gams** in Hegi, *Illustr. Fl. Mittel-Europa*, **5** (4) 2373 (1927). (*N. nuda* L. var. *albiflora* Boiss., *Fl. Or.* **4**, 663, 1879. *N. nuda* L. var. *parviflora* Benth., Lab. 486 : 1834.)

Prov. Antalya (Lycia) : Çalbalı Da., 2000-2100 m., fl. white, 14 Jul. 1949, 15294.

I have examined the type of *N. nuda* L. in the Linnean herbarium, and find it conspecific with the plant generally accepted as *N. pannonica* L.; the type of the latter is in Burser's herbarium, which I have not seen. Assuming that Bentham (Lab. 486 : 1834) was the first to unite the two

names, I have followed him in adopting *N. nuda* L. as the binomial for this species.

subsp. **glandulifera** Huber-Morath et Davis, subsp. nov.

Affinis subsp. *marrubioidi* Huber-Morath et Davis sed indumento glanduloso atque sparsiore recedit ; a subsp. *albiflora* Gams foliis latioribus insuper differt.

Caules erecti, 40–70 cm. alti, ramosi, pilis glandulosis patentibus viscoso-pubescentes. *Folia* ovata, subsessilia, basi cordata, apice valde obtusa, 3–4.5 cm. longa, 2–3.5 cm. lata, utrimque 9–13-serrato-crenata (crenis obtusis), breviter glanduloso-pubescentia, viridia. *Folia floralia* diminuta, superiora lanceolata, integra, pedunculos superantia. *Verticillastra* 7–13-nata, remota, e cymis pedunculatis densis 3–20-floris composita, in racemos cylindricos interruptos disposita. *Bractaeae* anguste lineares, acutae, tubo calycis saltem duplo breviores. *Calyx* 4.5–5.0 mm. longus, parum curvatus, striatus, ore \pm obliquus, pilis brevibus curvatis glandulosis et eglandulosis breviter pubescent-hispidulus ut pedunculi et pedicelli et bractaeae, fere ad medium in dentes anguste lanceolatos anguste membranaceo-marginatos 5-fissus, tubo in fructu ampliato poculiforme. *Corolla* alba, gynodioica, \varnothing 8 mm. longa, ♀ 6 mm. longa (staminibus \pm abortivis). *Nuculae* late oblongae, obtusissimae, nigrae, praesertim in parte superiore papillosae, 1.75 mm. longae, 1 mm. latae. Floret Jun.–Aug.

Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Beşkuyu and Çamulu Y. (between Ermenek and Anamur), 1900 m., rocky slopes, fl. white (♀) 17 Aug. 1949, *Davis 16270* (typus in *Herb. Kew.*) ; near Çamurlu Y., 2100 m., foot of shady rocks, fl. white (\varnothing), 17 Aug. 1949, *Davis 16259* ; Prov. Konya, distr. Bozkir (Isauria) : between Konya and Bozkir, in gorge of the Çarsamba river, 74 km. S. of Konya, 1070 m., 14 Jun. 1948, *A. Huber-Morath 8464*, *H. Reese*, *J. Renz*.

Dr. Huber-Morath's gathering differs from mine (on which the description is based) in having larger calyces up to 8 mm. long.

The new subspecies is closely related to the densely hairy, broad-leaved plant previously known as *N. marrubioides* Boiss. et Heldr.—a later homonym of *N. marrubioides* Willd. *N. nuda* L. subsp. *glandulifera* differs from *N. marrubioides* Boiss. et Heldr. (originally described from Kara Da. in Lycaonia) only in its glandular, less thick indumentum. *N. marrubioides* Boiss. et Heldr. is connected to *N. nuda* L. subsp. *albiflora* Gams by intermediate forms, both in leaf-shape and density of indumentum. Dr. Huber-Morath and I have therefore agreed to treat both *glandulifera* and *marrubioides* as subspecies of the widespread and variable *N. nuda* L. Like subsp. *albiflora* Gams, they are both white-flowered in contrast to the typical violet-flowered form of the species that is predominantly more westerly in its distribution. Subsp. *glandulifera* is the only glandular-haired form of *N. nuda*, and appears to have a well-defined geographical area.

subsp. **marrubioides** Huber-Morath et Davis, subsp. nov. (*N. marrubioides* Boiss. et Heldr. in Boiss., *Diagn. Ser.* 1 (12) 67 : 1848, non Willd., *Enum. Hort. Berol.* 603 : 1809=*N. italica* L.)

Nepeta phyllochlamys P. H. Davis (Sect. *Eunepeta* aff. Subsect. *Macrostegiae* Boiss.).

Species haec propter bracteas foliaceas valde distincta, ut videtur affinis *N. decumbenti* P. H. Davis sed habitu minus pumilo, indumento densiore, foliis vix cordatis, foliis floralibus longius petiolatis, bractearum forma, cymis pedunculatis in verticillastra latiora subremota dispositis, tubo corollae incluso facile distinguenda.—A *N. mussini* Sprengel ex Henke foliis vix cordatis, foliis floralibus manifeste petiolatis, bracteis foliaceis, floribus minoribus, dentibus calycis longioribus angustioribus, corolla sordide lactea tubo incluso inter alia longe distat.

Planta perennis, suffrutescens, ramis decumbentibus numerosis. *Caules* floriferi ascendentes, 5–12 cm. longi, circ. 1 mm. lati, subquadrangulares, breviter tomentosi, superne simplices, inferne turiones steriles emittentes. *Folia* breviter et appresse tomentosa, cinerea, petiolata; lamina triangulari-ovata, 10–15 mm. longa, 8–13 mm. lata, basi truncata vel etiam subcordata, apice obtusa, utrinque regulariter 8–10-crenata (crenis obtusis), leviter rugulosa, petiolo duplo longior; eae turionum sterilius minores densius vestitae. *Folia floralia* caulinis simillima sed paulo brevius petiolata, aliquantum diminuta, cymis longiora. *Verticillastra* 2–5-nata, subremota, inter se 0.5–2.5 cm. distantia, 1–2.2 cm. lata. *Cymae* 3–11-florae, pedunculis divaricatis 2–6 mm. longis, pedicellis brevissimis. *Bracteae* foliosae, forma sensim gradatae, breviter tomentosae, petiolatae; laminae petiolum subaequant, bractearum inferiorum triangulari-ovatae vel ovatae, basi \pm truncatae vel etiam subcordatae, 5–7 mm. longae, subcrenatae, indistincte reticulato-nervosae, calycibus breviores, bractearum superiorum minores, \pm anguste ellipticae, integrae. *Calyx* circ. 7 mm. longus, tubulosus, parum curvatus, distincte nervosus, ore aliquantum obliquus, extus molliter tomentosulo-hirsutus, intus glaber, ad $\frac{1}{3}$ – $\frac{2}{5}$ in dentes anguste lanceolatos acutos vix membranaceo-marginatulos fissus, tubo in fructu paulo ampliato. *Flores* ut videtur gynodioici. *Corolla* (φ) 9 mm. longa, extus pubescens; tubi inclusi pars angusta 5 mm. longa et 0.5 mm. lata; labium superius 2 mm. longum, lacteum, profunde retusum, lobis obtusissimis 1.5 mm. latis; labium inferius pallidissime roseo-albidum, trilobatum, lobo mediano subreniforme, 2.5 mm. longo, 4.25 mm. lato, lilacino-maculato crenulato supra barbatulo, lobis lateralibus brevissimis rotundatis. *Filamenta* in fl. σ 2–2.5 mm. longa, in fl. φ 1 mm. longa. *Nuculae* oblongae, 1.75 mm. longae, 0.75 mm. latae, obtusissimae, dense tuberculatae, nigricantes.—Floret Jun.

Prov. Antalya (Lycia): Söğüt Y. near Sivri Da. (W. of Antalya), rocky places in woods, 16 Jul. 1949, *Davis 15431* (typus in Herb. Kew.); distr. Kemer (Lycia), Teke Da. near Ovacik (W. of Kemer), among rocks, 1100 m., 12 Jul. 1949, *15219*, and Kesme Boğ. near Kemer, 60–100 m., rocky slope, 14 Aug. 1947, *14052* (“*Nepeta* sp. nov.,” Davis in Kew Bull. 1949: 404, and cult. in Herb. Ground, Roy. Bot. Gard., Kew, 18 Jun. 1949).

Because of its unique foliaceous bracts, the Lycian *N. phylloclamys* does not fall readily into either of Boissier's two subsections of Sect. *Eunepeta* with tuberculate nutlets, although Subsect. *Macrostegiae* Boiss. (divided into two subsections by Briquet in Engler and Prantl, Pflanzenf. 4 (3a) 236: 1897) might be emended to accommodate it. However, the new species has no relatives in Subsect. *Macrostegiae*, its affinities being with *N. decumbens* P. H. Davis and *N. mussini*, both of which, on account of

their lanceolate or linear-subulate bracts, belong to Subsect. *Stenostegiae* Boiss. (split into four subsections by Briquet, *l.c. supra*). The calyx of *N. decumbens* is indeed almost identical with that of *N. phyllochlamys*, suggesting that the latter, despite the remarkable form of its bracts, is most closely related to *N. decumbens* from Cilicia Trachea. *N. phyllochlamys* may have to be made the type of a new subsection.

Nepeta pilinux P. H. Davis in Kew Bull. 1949 : 402 (1949).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., N.E. side, 2000 m., between boulders in dry torrent bed, fl. white, 25 Jul. 1949, 15675. Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da. above Oruz Gaz Y., scree, fl. white with a pinkish tinge, 2 Aug. 1949, 15960 ; Dedegöl Da. at Taş Oluk Y., 2100 m., fl. whitish, 2 Aug. 1949, 16065.

No. 16065 and 15676 have more slender teeth than the type, and 15676 has subcordate stem leaves, thus bringing the species still nearer to the Peloponnesian *N. camphorata* Boiss. et Heldr., from which, however, it remains clearly distinguished by the shape of its membranous-margined bracts.

Nepeta sulfuriflora P. H. Davis, sp. nov. (Sect. *Eunepeta* Benth. Subsect. *Stenostegiae* Boiss.).

Affinis *N. cadmea* Boiss. sed caulibus floriferis inferne patenter hirsutis, foliis viridioribus, bracteis brevioribus appressis tubum calycis \pm aequantibus, tubo corollae sulfureae calycum superante differt.

Planta perennis, basi lignescens, ramis primariis breviter decumbentibus. *Caules* floriferi 30–50 cm. alti, simplices vel simpliciter ramosi, erecti, quadrangulares, medio 1–1.5 mm. lati, superne et inter verticillastra pilis eglandulosis brevissimis appressis \pm canescentes, inferne papillis glandulosis et pilis longis eglandulosis patentibus hirsuti ut caules turionum sterilium. *Folia* caulium floriferorum petiolata ; lamina triangulari-ovata, 2–3.2 cm. longa, 1.3–2.4 cm. lata, subobtusata, crenata, basi cordata, pilis brevissimis eglandulosis appressis vestita, supra virescens, subtus canescens glanduloso-punctata, petiolo plerumque 2–3-plo longior ; folia turionum sterilium similia sed duplo minora, longius petiolata, papillis glandulosis et pilis longis eglandulosis hirsuta, manifestius glanduloso-punctata, \pm obtusa vel nunc abrupte acuminata. *Verticillastra* 3–11-nata, 6–25-flora (inferiora plerumque 3–4 cm. distantia, summa approximata) in spicam interruptam 2–16 cm. longam disposita, fructu 8–17 mm. lata. *Folia floralia* caulinis similia sed brevius petiolata, minus crenata, \pm acuta vel acuminata, basi truncata, calycibus longiora, superiora anguste ovata vel lanceolata, subsessilia, acutissima, calycibus breviora. *Flores* subsessiles in cymas breviter pedunculatas congestas dispositi. *Bracteae* \pm numerosae, subulatae, rigidae, manifeste uninerviae, vix albo-marginatae, tubum calycis \pm aequantes, appressae. *Calyx* statu florifero 6–6.5 mm. longus, 15-nervosus, pilis brevibus eglandulosis curvatis et papillis subsessilibus glandulosis subcanescens, parum curvatus, ore obliquus, ad medium in dentes subulatos vix albo-marginatos fissus ; dens posterior ceteris paulo longior. *Corolla* sulfurea (saepe pallida), 12 mm. longa, extus pubescens, tubo superne curvato exserto ; labium superius 2.5 mm. longum, obcordatum ; labium inferius 6 mm. longum, lobis lateralibus brevissimis late rotundatis, lobo mediano ambitu transverse reniformi-

elliptico barbato, 3.5 mm. longo, 7 mm. lato, ad tertiam partem in lobulos anguste triangulari-oblongos obtusos 7-9-digitato. *Stamina* 2-3 mm. longa. *Nuculae* late oblongae, 1.75 mm. longae, 1 mm. lati, obtusae, subtriquetae, tuberculatae, nigrae.—Floret Jul.-Aug.

Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Beşkuyu and Çamurlu Y. (between Ermenek and Anamur), 1900 m., very local on steep rocky sides of limestone ravine, erect, fl. sulphur-yellow but often pale, 17 Aug. 1949, *Davis 16275* (*typus in Herb. Kew.*).

N. sulfuriflora is certainly as well, if not better, distinguished from the closely related white-flowered *N. cadmea* Boiss. (with a more westerly distribution) as the latter is from *N. italica* L. (including *N. leucostegia* Boiss. et Heldr.). The new species also approaches *N. italica*, especially the more typical forms, from which it differs by its greener leaves, hirsute indumentum in the lower part of the flowering stems and sterile shoots, smaller whorls, fewer bracts that are subulate and only half as long as the calyx, and sulphur (not white) corolla with the tube overtopping the calyx-teeth. Unlike *N. sulfuriflora*, the sterile shoots and the lower part of the flowering stems of *N. cadmea* (as in *N. italica*, s. *lato*) are not usually hirsute with long spreading hairs. But that form of indumentum occurs on sterile shoots in my gatherings of *N. cadmea* from N.E. of Antalya (*Davis 15136 & 15910*) ; however, the much shorter, appressed bracts of *N. sulfuriflora*, and its characteristic flower-colour (in my experience its allies are all white-flowered), warrant specific rank.

Origanum amanum Post in Bull. Herb. Boiss. Ser. 1, **3**, 161 (1895).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., 1800 m., on rocks in steep gulley, 27 Aug. 1949, *16390* ; Dildil Da., above Atlik Y., 2000 m., on sloping limestone rocks, 27 Aug. 1949, *16439*.

The very rare *O. amanum*, undoubtedly the most spectacular species in its genus, was collected on the same mountain by Haradjian. In my material the corolla measures up to 3.4 cm. in length. A plant sent home by air has become established in cultivation.

Origanum* x *dolichosiphon P. H. Davis, hybr. nov. (= *O.* [Sect. *Amaracus* (Gled.) Benth. emend. Boiss.] *amanum* Post x *O.* [Sect. *Euoriganum* Vogel] *laevigatum* Boiss.)

Ab *O. amano* Post foliis brevissime petiolatis minus prominenter nervosis basi haud cordatis, spicis in pedunculos breves binos in axillis foliorum superiorum dispositis inflorescentiam ambitu anguste oblongam formantibus, bracteis 2-3-plo minoribus angustius ellipticis, floribus minoribus, calyce fauce barbatulo, labio superiore in dentes lanceolatos profundius fisso, corollae tubo minus exserto, limbo minore differt.

Ab *O. laevigato* Boiss. caulibus brevioribus inferne breviter hispidulis superne haud panniculato-corymbosis, foliis latioribus ovatis basi abrupte truncatis brevius petiolatis margine scabro-ciliatis, bracteis duplo majoribus textura tenuioribus proportionem paulo latioribus calyces occultantibus, calyce paulo majore bilabiato indistinctius nervoso fauce minus barbato, dentibus longioribus lanceolatis ciliatulis, corollae tubo graciliore, staminibus subsessilibus recedit.

Calyx 6 mm. longus, ad $\frac{2}{5}$ vel paulo ultra bilabiatus. Corolla 16 mm. longa, purpureo-rosea. Grana pollinis et ovula abortiva.—Floret Aug.

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., in steep gully between Başkonuş Y. and Huseyin Oluk Çe., 1800 m., fl. purplish pink, *O. amanum* and *O. laevigatum* both found nearby, 27 Aug. 1949, Davis 16412 (*typus in Herb. Kew.*).

This hybrid, the first indisputable cross between Sect. *Amaracus* and Sect. *Euoriganum*, is between species that are morphologically extremely dissimilar. A colony of about six plants was found, on a boulder in the bed of a gully. As the hybrid is evidently sterile, and has a somewhat repent habit, it seems probable that the colony consisted of a single clone. *O. amanum* favours altitudes above 1800 m., but is very local. *O. laevigatum* is found chiefly below 1500 m., but occurs sparsely at 1800 m. on southern exposures. The hybrid was found at the point of overlap between the two species. Lower down, *O. laevigatum* crosses with *O. syriacum* L. to form *O. x symeonis* Mouterde (*vide infra*).

***Origanum dubium* Boiss., Fl. Or. 4, 553 (1879).**

Prov. Mersin, distr. Anamur (Cilicia Trachea) : Olucak Y., between Ermenek and Anamur, 1400 m., 18 Aug. 1949, 1633*b* ; *ibid.*, 1500 m., S. slopes, fl. white 18 Aug. 1949, 1633*a* ; Kükür (above Anamur), 900 m., in *Pinus brutia* - *Quercus* *sp.* woods, 18 Aug. 1949, 1634*i*. Prov. Antalya, distr. Alanya (Pamphylia/Isauria) : between Kozlu D. and Kargi Ça. (N.E. of Alanya), 1000 m., 26 Aug. 1947, 14274 (“*O. majoranoides* Willd.”, Davis in Kew Bull. 1949 : 408).—Det. Burt & Davis.

Mr. B. L. Burt is cultivating *O. dubium* Boiss. and *O. majoranoides* Willd. in the Herbarium Ground at Kew, and finds them readily distinguishable ; nevertheless, there is a certain degree of overlap in the abundant herbarium material of these plants from Cyprus. Re-determination of Davis 14247 shows that *O. majoranoides* is still unknown as a wild plant outside Cyprus. Material of *O. majoranoides* from Spain (where it is believed to be a naturalised alien) has narrower leaves than in the Cyprus forms.

***Origanum gracile* C. Koch in Linn. 21, 661 (1848). (*O. viride* (Boiss.) Hal. in Denkschr. Akad. Wiss. Wien, 61, 481 : 1894.)**

Prov. Isparta, distr. Sütçüler (Pisidia) : between Tota Beyli Y. (on Kuyucuk Da.) and Daribükü, 900–1400 m., metamorphic soils, fl. white, 30 Jul. 1949, 15893 ; Dedegöl Da., between Selköşe and Oruz Gaz Y., 1300 m., metamorphic slopes, fl. white, 1 Aug. 1949, 15930. Prov. Konya, distr. Beyşehir (Isauria) : between Hoyran and Kurucaova, in ditches, fl. white, 4 Aug. 1949, 16087.

I am by no means certain that specific rank should be accorded to *O. gracile* (the name taken up by Handel-Mazzetti in Ann. K. K. Nat. Hofmus, Wien, 27, 420 : 1913), but if *O. heracleoticum* is to be maintained as a species it seems logical that *O. gracile* should be given equivalent rank. They might both be considered subspecies of *O. vulgare* L. The outline of the inflorescence and the flower-colour are important characters in this critical group that has long been in need of revision. In the Levant *O. gracile* and *O. heracleoticum* are often difficult to distinguish from each other, especially in Northern Iraq, where intermediates occur. In *O. heracleoticum* and *O. gracile* the presence (or absence) of glands on the bracts (often taken as a “key” character) is not always correlated with the shape of the inflorescence characteristic for each species.

My specimens of *O. gracile* are the only ones that I have seen from the Southern Anatolia ; but there is material in the Kew Herbarium from Amasya and Armenia.

***Origanum heracleoticum* L., Sp. Pl. 589 (1753).**

Prov. Adana, distr. Karaisah (Cilicia) : Bulgar Da., between Pozanti and Meydan Y., 1500 m., abundant on the hillsides, fl. white, 1 Sept. 1949, 16588.

Specimens from the Taurus usually have larger bracts than one finds in European material. For remarks on the affinities of this species with *O. gracile* C. Koch, see the note on the latter.

***Origanum laevigatum* Boiss. in Ann. Sc. Nat. Bot. Ser. 4, 2, 252 (1854).**

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., 1500 m., 27 Aug. 1949, 16391 ; *ibid.*, 1800 m., rare, 16381 ; Dildil Da. above Haruniye, 400–500 m., in maquis (*Quercus*—*Phylleria*) and open woodland (*Ostrya carpinifolia*, etc.), many-stemmed, fl. purple, 26 Aug. 1949, 16371.

On Dildil Dağ this very distinctive species ascends to 1800 m. on southern exposures, but is rare above 1500 m. : on northern slopes it becomes very scarce above 1300 m. Hitherto recorded only from the Amanus region, a specimen has recently been received at Kew collected near Larnaka in Cyprus by Haradjian (1013). When travelling from Mersin to Pozanti in the Cilician Taurus, I saw from the train an *Origanum* that appeared to be *O. laevigatum*.

***Origanum leptocladum* Boiss., Fl. Or. 4, 548 (1879).**

Prov. Konya, distr. Ermenek (Isauria) : between Ermenek and Balkusan D., 1500 m., on marly hillsides, large bushy plants, fl. purple, 14 Aug. 1949, 16194 ; (Cilicia Trachea) Sarivadi, 1300 m., 16 Aug. 1949, 16237.

These two localities are on opposite sides of the Göksu valley.

***Origanum micranthum* Vogel in Linn. 15, 77 (1814).**

Prov. Adana, distr. Karaisah (Cilicia) : Bulgar Da., between Pozanti and Meydan Y., 1500 m., dry gulley, 1 Sept. 1949, 16586 (*forma foliis angustioribus minus obtusis distinctius nervosis a typo differt*).

This small gathering, quoted under *O. micranthum* Vogel because its calyx is typical for that species, may possibly be the product of hybridisation between *O. micranthum* and *O. heracleoticum* L. that grew beside it. Another gathering from the same place (16586) appears to be a hybrid between these two species, though, as the calyx resembles that of *O. heracleoticum*, even that may be a depauperate form of the latter, differing in its dwarfer stature, shorter spikelets, smaller leaves and shorter bracts that are more pilose ; fully formed nutlets suggest that it is fertile. Both numbers were collected in a very arid locality and were grazed. I did not collect any typical *O. micranthum*, though *O. heracleoticum* was abundant. It seems possible that a hybrid swarm is involved.

***Origanum minutiflorum* Schwarz et Davis apud Davis in Kew Bull. 1949 : 408 (1949).**

Prov. Antalya, distr. Lycia : near Çalbalı Da., between Kar Çukuru and Fesliken Y., 14 Jul. 1949, 15402 ; distr. Gebiz (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 24 Jul. 1949, 15509, and at Taşlı Y., 1700 m., open rocky slopes, fl. white, 27 Aug. 1949, 15773.

The two gatherings from Bozburun Dağ approach *O. bilgeri* P. H. Davis (Kew Bull. 1949 : 406) in having rather broader and larger leaves, and a slightly denser indumentum than in the type of *O. minutiflorum*. When more material becomes available, it will be necessary to review the status of these two species in relation to each other and to *O. micranthum* Vogel.

Origanum onites L., Sp. Pl. 590 (1753).

Prov. Antalya, distr. Kemer (Lycia) : Gönük, fl. white, 7 Aug. 1949, 15012 ; Tahtalı Da., near Kuzdere Y., 8 Jul. 1949, 15133 ; distr. Gebiz (Pisidia) : Bozburun Da., near Pinargözü Y., on rocks, fl. white, 23 Jul. 1949, 15522.

Origanum saccatum P. H. Davis in Kew Bull. 1949 : 409 (1949).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Daribükü and Selköşe, 30 Jul. 1949, 15857 (*alabastra*).

Origanum sipyleum L., Sp. Pl. 589 (1753).

Prov. Konya, distr. Beyşehir (Isauria) ; Sariköy near Beyşehir, in steppe, 5 Aug. 1949, 16122.

Origanum x **symeonis** Mouterde in Ann. Fac. Médec. Beyrouth, 6 (reimpr.) 3 (1935). (= *O. laevigatum* Boiss. x *O. syriacum* L.)

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. near Gökçayır, in limestone ravine with *O. laevigatum* and *O. syriacum*, fl. purplish lilac, scattered sparsely among the parents, 27 Aug. 1949, 16417 (*forma dentibus calycis ciliatis a typo [e descr.] divergit ; etiam nonnulla grana pollinis et ovula fertilia ut videntur, nuculas formantia*).

Origanum syriacum L., Sp. Pl. 590 (1753).

Prov. Adana, distr. Bahçe (Amanus) : Gökçayır at foot of Dildil Da., 600 m., with *O. laevigatum* in gulley, fl. white, 27 Aug. 1949, 16415.

Phlomis armeniaca Willd., Sp. Pl. 3, 119 (1800). (*P. linearis* Boiss. et Bal. subsp. *anticragi* P. H. Davis in Kew Bull. 1949 : 412.)

Prov. Antalya (Lycia) : Söğüt Cuması Y. between Teke Da. and Çalbalı Da., 1400 m., 13 Jul. 1949, 15242a & b ; Çalbalı Da. near Çukur Ardiç Y., 1700 m., 15 Jul. 1949, 15390 ; distr. Gebiz (Pisidia), Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 24 Jul. 1949, 15577.

Phlomis chimerae de Boissieu in Bull. Soc. Bot. France, 43, 290 (1896).

Prov. Antalya, distr. Kemer (Lycia) : Gönük, below 100 m., rocky places in the gorge, 7 Jul. 1949, 15016.

In Kew Bull. 1949 : 411, I omitted to state that the identification of Tengwall's gathering of this rare species was due to Dr. Huber-Morath (*in litt.*). Plants of *P. chimerae* are being raised from seed collected at Kesme Boğaz near Kemer in 1949.

Phlomis grandiflora H. S. Thompson in Ann. Bot. (London) 19, 441 (1905).

Prov. Antalya (Pisidia) : Termessus, 600 m., 19 Jul. 1949, 15450 ; distr. Kemer (Lycia) : Teke Da. near Ovacik, 1100-1200 m., 12 Jul. 1949, 15182 ; Tahtali Da. at Kuzdere Y., 900 m., 8 Jul. 1949, 15155 ; distr. Gebiz (Pisidia), Bozburun Da. at Pinargözü Y., 600 m., 22 Jul. 1949, 15488. Prov. Konya, distr. Beyşehir (Isauria) : Kurucaova at the foot of Dedegöl Da., limestone hillsides with S. exposure, 4 Aug. 1949, 16091.—One of the commonest Labiates between Finike and the lake of Beyşehir.

Phlomis leucophracta Davis et Huber-Morath, sp. nov. (Sect. *Euphlomis* Benth. Subsect. *Dendrophlomis* Benth. Ser. *Angustebracteatae* Vierh.).

Affinis *P. viscosae* Poiret (incl. *P. bourgaei* Boiss.) et *P. longifoliae* Boiss. et Blanche sed lamina foliorum albo- (vel aureo-) marginata, bracteis semper angustissime lanceolatis fere e basi sensim angustatis, dentibus calycis longioribus (6-13 mm. longis), corolla bicolore aurea galea ferrugineo-suffusa inter alia facile distinguenda. Indumentum aliquantum glanduliferum.

Frutex habitu *P. viscosae* Poiret, 1-1.5 m. altus et latus, divaricato-ramosus, ramis crassis cortice in senectute longitudinaliter fisso. *Folia* petiolata ; lamina triangulari-lanceolata, apice obtusa, basi cordata, marginem leviter crenatum saltem aestate subinvolutum album (vel aureum) exhibens, matura (ea turionum sterilium minor, densius vestita) 10-12 cm. longa, basi 2, 5-3.5 cm. lata, pilis subaequaliter stellatis (rarius simplicibus) glandulosis et eglandulosis oblecta, supra breviter substellato-tomentosa virescens \pm viscidula, subtus minus glandulifera densissime et breviter stellato-tomentosa albicans (vel aurea) vix viscidula ; petiolus 4-4.5 cm. longus, propter pilos valde inaequaliter stellatos (glandulosos et eglandulosos) viscidulo-stellato-villosus. *Caulis* floriferus terminalis simplex vel subramosus, 25-35 cm. longus, una cum axillaribus brevioribus subcandellabrum saepe formans. *Folia floralia* brevius petiolata, inferiora basi subcordata, superiora brevissime petiolata basi truncata vel late cuneata. *Verticillastra* 1-3-nata, in fructu 4-4.5 cm. lata, 6-11 cm. inter se distantia. *Bracteae* angustissime lanceolatae, fere e basi ad apicem aristatum sensim angustatae, 17-22 mm. longae, 1.5-2.0 mm. latae, tubo calycis sub-longiores, inferne appressae, superne \pm patentes, breviter viscoso-stellato-tomentosae. *Calyx* (in fructu) 2.3-2.8 cm. longus, inaequaliter 5-dentatus, pilis stellatis glanduliferis et eglanduliferis in toto breviter viscoso-stellato-tomentosus ; tubus anguste infundibularis, 14-16 mm. longus, fauce 7 mm. latus ; dentes parte basali truncati etiam obcordati, in subulas longas vix vel valde patentes abeuntes, bini 10-12 mm. longi, caeteri breviores 5-9 mm. longi. *Corolla* bicolor, 32 mm. longa, paulo infra medium bilabiata ; tubus aureus, 14 mm. longus, in parte inferiore 2 mm. latus, in parte superiore ampliatus 4.5 mm. latus ; galea ex toto intense ferrugineo-suffusa, 18 mm. longa, extus brevissime stellata et glandulifera, apice leviter et obtusissime trilobata, intus barbata ; labium inferius aureum, 16 mm. longum et latum, trilobatum, subtus brevissime substellatum, lobo mediano late orbiculare retuso, 8 mm. longo, 11 mm. lato (basi 7 mm. lato angustato), lobis lateralibus triangularibus (sed ad marginem anteriorem rotundatis) breviter et obtuse acuminatis. *Nuculae* ovato-oblongae, 5 mm. longae, 2 mm. latae, subtriquetrae, obtusae, laeves, fuscae.—Floret Jun.

Prov. Antalya, distr. Gebiz (Pisidia) : Sinni (Nenni) Ça. between Gebiz and Pinargözü Y. on Bozburun Da., 300 m., dry hillsides, 22 Jul. 1949, *Davis 15481* ; distr. Alanya (Pamphylia), at Alanya, 23 Aug. 1947, *Davis 14482* (" *P. viscosa* subsp. *bourgaei* (Boiss.) Davis ", Davis in Kew Bull. 1949 : 414) ; distr. Manavgat (Isauria), *Quercetum* near the village of Akseki, 1090 m., 19 June 1948, *A Huber-Morath 8410*, *J. Renz.* Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da. between Selköşe and Daribükü, 900–1100 m., on metamorphic slopes with *Quercus macrolepis*, 1–1.5 m. tall, leaves green above with white margin, 30 Jul. 1949, *Davis 15872* (*typus in Herb. Kew.*). Prov. Mersin, distr. Anamur (Cilicia Trachea) : Kükür (above Anamur), 900 m., on metamorphic and calcareous soils in woods of *Pinus brutia* and *Quercus* sp., 18 Aug. 1949, *Davis 16342* ; above Gilindere, 300 m., maquis, 20 Aug. 1949, *Davis 16354*.

This distinctive and beautiful species appears to have a fairly wide (though interrupted) distribution from Pisidia to Cilicia Trachea. From its allies, *P. viscosa* Poiret (*s. lato*) and *P. longifolia* Boiss. et Blanche, it differs in having a white, slightly involute leaf-margin, bracts that are always very slenderly lanceolate and narrowed almost from the base, longer calyx-teeth, and bicoloured corolla, the hood being rust-coloured inside and out, whereas the tube and lower lip are golden yellow. Having collected the species only in fruit, I am indebted to Dr. Huber-Morath for notes on the flower-colour.

P. leucophracta appears in the key given under *P. schwarzii* Davis described below.

Phlomis lycia *D. Don* in Fellows, Discov. Lycia, 293 (1841).

Prov. Antalya (Pisidia) : Termessus, in scrub with *Quercus coccifera*, 600 m., 19 Jul. 1949, *15448* ; distr. Kemer (Lycia), Kesme Boğ. near Kemer, 50 m., only one plant found, 8 Jul. 1949, *15115*.

Phlomis monocephala *P. H. Davis* in Kew Bull. 1949 : 412 (1949).

Prov. Mersin, distr. Anamur (Cilicia Trachea) : Olucak Y. between Ermenek and Anamur, 1500 m., open calc. S. slopes in *Cedretum*, shrub 1–1.25 m. tall, 18 Aug. 1949, *16334a* (*fruct.*) ; distr. Gülnar (Cilicia Trachea), between Gökbelen and Gülnar, by roadside, 20 Jul. 1949, *16352* (*fruct.*).

As the type gathering was a small one and its foliage was represented by young summer-leaves, a brief emended description is given here to include the new material :

Folia turionum sterilium petiolata ; lamina matura ad 6.5 cm. longa et 3.5 cm. lata, oblongo-ovata, basi cuneato-truncata ; petiolus ad 2 cm. longus ; folia caulium floriferorum simillima sed petiolis brevioribus. *Verticillastra* 1–2, corolla exclusa 1.8–2.7 cm. diametro. *Bracteae* anguste obovato-ellipticae dimidium vel vix duos partes calycis aequantes. *Calyx* 10–12 mm. longus. *Corolla* adhuc ignota.

Phlomis nissolii *L.*, Sp. Pl. 585 (1753).

Prov. Antalya, distr. Gebiz (Pamphylia) : near Gebiz, 50 m., fallow fields, 21 Jul. 1949, *15466*. Prov. Konya, distr. Beyşehir (Isauria) : between Hoyran and Kurucaova, 1100–1200 m., dry calc. hills, herbaceous, 4 Aug. 1949, *16089*.

Phlomis pungens Willd. var. **laxiflora** Vel. in Sitz. Böhm. Ges. Wiss. 460 (1887).

Prov. Antalya, distr. Kemer (Lycia) : Teke Da. at Ovacik, 1200 m., edge of fields, 12 Jul. 1949, 15335.

My gathering from the Vilâyet of Ankara, referred to *P. herba-venti* in Kew Bull. 1949 : 412, should have been named *P. pungens* Willd. Krausse (Ankaranin Floru, ed. 2, 140 : 1937) records *P. herba-venti*, but not *P. pungens*, from the Ankara district ; however, I have seen no specimens from that area that could be assigned to the former species. The relationship of *P. pungens* to the predominantly more westerly *P. herba-venti* needs investigation. Briquet (in Engler & Prantl, Pflanzenf. 4 [3a] 249 : 1895) has suggested that the former may be a subspecies of the latter.

Phlomis rigida Lab., Ic. Pl. Syr. Rar. 3, 15 (1809).

Prov. Konya, distr. Ermenek (Cilicia Trachea) : between Hamitseydi Boğ. and Beşkuyu (S. of Sarivadi), fallow field, fl. pinkish purple, 16 Aug. 1949, 16246.

Phlomis samia L., Sp. Pl. 585 (1753).

Prov. Antalya (Lycia) : Söğüt Y. near Sivri Da., in woods of *Pinus nigra* subsp. *pallasiana*, *P. brutia*, and *Cedrus libani* subsp. *stenocoma*, 16 Jul. 1949, 15367 ; distr. Kemer (Lycia), Teke Da. near Ovacik, 1100–1200 m., fl. greenish, 12 Jul. 1949, 15171. Prov. Isparta, distr. Sütçüler (Pisidia) : between Tota Beyli Y. (on Kuyucuk Da.) and Daribükü, metamorphic soils, herbaceous, 30 Jul. 1949, 15894.

Phlomis schwarzii P. H. Davis, sp. nov. (Sect. *Euphlomis* Benth. Subsect. *Dendrophlomis* Benth. Ser. *Angustebracteatae* Vierh.).

Affinis *P. viscosae* Poiret (incl. *P. bourgaei* Boiss.) sed foliis longioribus angustissime triangularibus pilis subregulariter stellatis eglandulosis in toto dense tomentosis divergit.

Frutex 1–1.5 m. altus et latus, divaricato-ramosus. *Folia* longa, pilis subregulariter stellatis eglandulosis in toto dense stellato-tomentosa ; lamina angustissime triangularis, apice obtusiuscula vel subacuta, basi cordata, ad marginem leviter crenatum plana vel subrevoluta, minute rugulosa, supra canescens, subtus cana (vel aurea), matura ad 16 cm. longa, basi ad 4.6 cm. lata, turionum steriliū brevior densius vestita ; petiolus maturus circ. 3 cm. longus. *Caules* floriferi simplices, pilis glandulosis valde irregulariter stellatis villosito-tomentosi, viscosi. *Folia floralia* ignota. *Verticillastra* 2-nata, in fructu 3–4 cm. lata, inter se 8–9 cm. distantia. *Bracteae* angustissime lineari-lanceolatae, apice pungentes, tubum calycis aequantes, 1–2 mm. latae, pilis subsimplicibus longissimis eglandulosis et pilis valde irregulariter stellatis glandulosis et eglandulosis viscidulo-villosae, ciliatae. *Calyx* in fructu infundibulari-tubulosus, ut bracteae viscoso-villosae praesertim ad nervos ; tubus 15 mm. longus, fauce barbatus 7 mm. latus ; dentes 5, inaequales, parte basali latissime truncati vel etiam paulo obcordati, in subulas patentes 1–3.5 mm. longas abeuntes. *Corolla* ignota. *Nuculae* oblongae, 4–5 mm. longae, obtusissimae, subtriquetrae, laeves, fuscae.—Floret Mai.

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Da. near Ağla,

600 m. in *Pinus brutia* woods on serpentine, 25 Jul. 1947, 13586 ("Phlomis sp. nov.?", Davis in Kew Bull. 1949 : 414). *Typus in Herb. Kew.*

Although the material is without flowers, further study of the indumentum in this group of species shows that the Sandras Dağ *Phlomis* should be considered specifically distinct from *P. viscosa* Poiret, *sensu lato*. Not only does *P. schwarzii* differ from the latter in its very long, narrow leaves—a striking feature in the field—but also in the nature of the leaf-indumentum; on the lamina the hairs are of one type only: stellate, almost regularly branched and eglandular. On the other hand, *P. viscosa s. lato* has shorter, more broadly triangular leaves bearing hairs of three kinds, in varying proportions: stellate eglandular; simple glandular; and simple eglandular. From *P. viscosa* subsp. *viscosa* it is further distinguished by its narrower bracts, and from subsp. *bourgaei* (Boiss.) Davis by its shorter calyx-teeth.

The new plant is named after Professor Otto Schwarz, who informs me (*in litt.*) that he discovered it on Sandras Dağ in 1938. It is the most westerly species of its group.

A key is given below, emphasising indumentum characters, to species related to *P. schwarzii* and *P. leucophracta* Davis et Huber-Morath.

Hairs of upper leaf-surface all eglandular :

Hairs of upper leaf-surface all stellate ; stem glandular
P. schwarzii P. H. Davis.

Hairs of upper leaf-surface simple and stellate ; stem ± eglandular
P. longifolia Boiss. et Blanche.

Hairs of upper leaf-surface glandular and eglandular, mixed :

Leaf-margin flat or revolute ; corolla ± concolorous
P. viscosa Poiret, *s. lato*.

Leaf-margin ± involute, white ; corolla bicoloured
P. leucophracta Davis et Huber-Morath.

Phlomis x **termessi** *P. H. Davis*, hybr. nov. (= *P. lycia* D. Don x *P. viscosa* Poiret subsp. *bourgaei* (Boiss.) Davis.)

A *P. lycia* D. Don indumento caulium ± glandulifero magis floccoso, verticillastris (sine corolla ad 2.8 cm. diametro) et foliis majoribus, bracteis tenuioribus fere e basi 2 mm. latis sensim angustatis minus appressis minus bombycinis, dentibus calycis paulo longioribus (2 mm. longis) recedit.—A *P. viscoso* Poiret subsp. *bourgaei* (Boiss.) Davis indumento subbreuiore minus glandulifero, foliis minoribus minus cordatis, verticillastris minoribus, bracteis appressis paulo brevioribus, dentibus calycis brevioribus distinguitur.—Ovula fertilia.

Prov. Antalya (Pisidia) : Termessus, 600 m., growing between *P. grandiflora* and *P. viscosa* subsp. *bourgaei*, but with *P. lycia* close by, 19 Jul. 1949, Davis 15452 (*typus in Herb. Kew.*).

The nutlets of this hybrid have germinated in cultivation. Another gathering from Termessus (Davis 15449) has also proved fertile, but I am uncertain whether it is a hybrid between *P. grandiflora* and *P. lycia*, or only a variant of the latter, from which it differs in its rather larger whorls and broader bracts. Termessus should be visited when these species of Subsect. *Dendrophlomis* are in flower; not only do *P. viscosa* subsp. *bourgaei*, *P. lycia* and *P. grandiflora* grow together, but *P. fruticosa* L.

has also been recorded from the same locality, so that interesting nothomorphs are to be expected.

Phlomis viscosa *Poiret*, *Encycl. Meth.* **5**, 271 (1804) subsp. **viscosa**.

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. above Haruniye, schistose hillsides, 26 Aug. 1949, 16374 ; Dildil Da. between Başkonuş Y. and Huseyin Oluk Çe., 27 Aug. 1949, 16396 (fl. out of season).

The area of the typical form of the species extends from the Amanus Mountains to Palestine, and also includes Cyprus. There is marked variation in the size and shape of the leaves, the length and posture of the calyx-teeth, the indumentum of the upper leaf-surface, the stalked or sessile nature of the flowers, and the width of the bracts ; the latter may be ciliate or not. Except for its glandular indumentum, *P. viscosa* subsp. *viscosa* can scarcely be separated from wide-leaved variants of *P. longifolia* Boissier et Blanche (*P. bailanica* Vierh.—a reduction made by B. L. Burt in sched.) which occur, like the typical form of *P. longifolia*, in the Lebanon and Amanus regions, and which are connected to the type by intermediates. It is possible that hybrids occur, and that *P. longifolia* should be treated as a subspecies of *P. viscosa* ; but field studies are required.

A remarkable specimen in the Kew Herbarium, collected at Beit Faghour near Jerusalem (Govt. of Palestine Forest Service, *R.G.532*), resembles *P. viscosa* in leaf-shape, but has linear bracts only 1 mm. broad, and eglandular stems. This appears to be as distinct an entity as several species in the section, but more material is required.

subsp. **bourgaei** (*Boiss.*) *Davis* in *Kew Bull.* 1949 : 413 (1949).

Prov. Antalya (Pisidia) : Termessus, 19 Jul. 1949, 15456 ; distr. Kemer (Lycia), Tahtali Da., between Kuzdere Y. and Gürleyik Y., 1300 m., 11 Aug. 1949, 15346 (*forma indumento magis glandulifero, bracteis latioribus, calyce abbreviato a typo divergit*), and Kesme Boğ. near Kemer, 50 m., 8 Jul. 1949, 15116.

P. viscosa subsp. *bourgaei* differs from the geographically separated subsp. *viscosa* only by its narrower bracts, and by the calyx teeth being usually longer and more spreading. The bracts of subsp. *viscosa* are usually less patent than in subsp. *bourgaei*, and those of the latter less spreading than in *P. schwarzii* P. H. Davis. The dimensional differences between the two subsp. of *P. viscosa* are given here :

	<i>Calyx-teeth length</i>	<i>Width of bracts</i>
Subsp. <i>viscosa</i> :	2-6 mm.	2-4 mm.
Subsp. <i>bourgaei</i> :	3-8 mm.	0.75-2.0 mm.

Prunella vulgaris *L.*, *Sp. Pl.* 600 (1753).

Prov. Antalya (Pamphylia) : Çakırlar, 20 m., dry river bed, 16 Jul. 1949, 15444 ; Söğüt Y. near Sivri Da., 16 Jul. 1949, 15434.

Salvia adenocaulon *P. H. Davis*, sp. nov. (Sect. *Plethiosphace* Benth.).

Species haec affinis *S. virgatae* Jacq. et *S. nemorosae* L. ; a priore base valde indurato-ramoso, caulibus brevioribus gracilioribus, magis glanduliferis ut in foliis floralibus, foliis parvis brevissime tomentosis, caulinis lanceolato-oblongis, floribus minoribus recedit ; ab altera foliis breviter lobatis (haud subsimpliciter crenatis), caulibus nanis tenuioribus, viscoso-pubescenti-hirsutis ut in foliis floralibus et calycibus, calyce violascente, corollae tubo subexserto, galea latiore magis falcata divergit.

Herba perennis, basi indurata et ramosa. *Caules* floriferi 10–30 cm. alti, 1–1.5 mm. lati, ascendentes, simplices vel subramosi, quadrangulares, pilis glandulosis patentibus et pilis eglandulosis ex toto dense sed breviter viscoso-hirsuti. *Folia* subradicalia petiolata; lamina anguste oblonga, 2–4.5 cm. longa, 0.6–1.7 cm. lata, basi abrupte truncata vel subcordata, superne angustata, obtusa, circ. ad $\frac{1}{4}$ breviter lobata (lobis crenatis), minute rugulosa, pilis eglandulosis septatis brevissime tomentosa, subtus canescentia glanduloso-punctata; petiolus laminam \pm aequans; folia caulina 2–4-juga, radicalibus simillima sed brevius petiolata, lanceolato-oblonga, superiora subsessilia. *Verticillastra* 3–13-nata, 4–6-flora, inter se distantia, spicam interruptam 5–18 cm. longam formantia. *Folia floralia* ovato-lanceolata viscoso-hirsuta, inferiora calyces subaequantia, superiora multo breviora. *Pedicelli* 1–2 mm. longi, dense villosuli, ebracteolati. *Calyx* 8 mm. longus, 13-nervosus, pilis glandulosis patentibus viscoso-pubescent, glanduloso-punctatus, ad medium bilabiatus; labium superius semiorbiculare, fructu leviter concavo-bisulcatum, vix 3 mm. longum, apice dentibus ternis brevissimis acutissimis convergentibus munitum; labium inferius 4 mm. longum, ad $\frac{3}{4}$ dentes lanceolatos spinuloso-acuminatos 3 mm. longos bifidum. *Corolla* ($\text{\textcircled{f}}$) pallide lilacina, 15 mm. longa, ad medium bilabiata, glanduloso-punctata; tubus 3 mm. supra basin ampliatus, intus exannulatus; galea falcato-compressa, breviter retusa, pubescens, compressa 2 mm. lata; labium inferius galea paulo brevius, trilobatum, lobo mediano orbiculari-reniforme 6 mm. lato subretuso lobis lateralibus ovato-oblongis obtusis saltem duplo longiore. *Connectivum* antherarum 8–9 mm. longum, antice abruptissime dilatatum, apice uncinato-callosum; locus fertilis 2.5 mm. longus, sterilis abortivus. *Nux* ignota.—Floret Aug.

Prov. Konya, distr. Ermenek (Cilicia Trachea): between Hamitseydi Boğ. and Beşkuyu (between Ermenek and Anamur), 1500–1700 m., rare, fl. pale lilac, 16 Aug. 1949, *Davis 16224* (*typus in Herb. Kew.*).

In habit and general leaf-outline the new species approaches *S. nemorosa* L., but in its glandular indumentum and corolla-form it resembles *S. virgatum* Jacq. In addition to the *differentiae* given in the diagnosis, the leaves are more manifestly gland-dotted and the calyx-lip even less deeply 3-toothed than is usual in either *S. virgata* or *S. nemorosa*. Though it is possible that the low stature, subsimple stems and small leaves of *S. adenocaulon* are direct modifications to an exposed habitat, it is certainly well distinguished from its allies by indumentum, floral characters and leaf-shape.

***Salvia amasiaca* Boiss. et Freyn** in Öst. Bot. Zeitschr. **41**, 58 (1891).

Prov. Antalya, distr. Gebiz (Pisidia): Bozburun Da., at Taşlı Y., 1700 m., fl. blue, 26 Jul. 1949, *15601*. Prov. Konya (Lycaonia): 15 km. W. of Konya, by roadside, fl. violet, 9 Sept. 1949, *16128*.

Davis 13120, collected in the Vilâyet of Ankara and referred in Kew Eull. 1949: 415 to *S. verticillata* L., should be placed under *S. amasiaca* Boiss. et Freyn, although in part of the gathering the long soft indumentum of the calyx is like that of the former species. In the Kew Herbarium the Turkish material of *S. verticillata* is all from the N.E. part of Anatolia. As intermediates occur, there seems a good case for con-

sidering *S. amasiaca* a subspecies of *S. verticillata*, to which rank it was reduced by Bornmüller in Bull. Herb. Boiss. Ser. 2, **8**, 220 : 1908.

Salvia aucheri Benth. in Ann. Sc. Nat. Bot. Ser. 2, **6**, 38 (1836).

Prov. Adana, distr. Karaisah (Cilicia) : between Gülek Boğ. and Pozanti, very eroded slopes, woody-based perennial 1 m. tall, fl. lilac, 30 Aug. 1949, 16476.

Salvia brevispicata P. H. Davis, sp. nov. (Sect. *Eusphace* Benth.).

Species haec affinis *S. potentillifoliae* Boiss. et Heldr. ex Benth. et *S. pisidicae* Boiss. et Heldr. ex Benth. ; a priore segmento terminale foliorum stipitato, foliis floralibus longioribus, verticillastris in spicam densam coarctatis, floribus minoribus, calyce minus ampliato, dentibus vix spinulosis inferioribus labio superiore sub-brevioribus recedit ; ab altera habitu erecto, segmento terminale foliorum majorum stipitato pro proportione latiore, foliis floralibus longioribus, verticillastris inter se manifeste condensatis, calycibus saepius majoribus differt.

Frutex 0.25–0.45 m. altus, erectus, hemisphaericus, divaricato-ramosus, ramis vetustioribus ascendentibus. *Folia* trisecta, petiolata ; segmentum terminale anguste obovato-ellipticum, 10–15 mm. longum, 6–11 mm. latum, breviter stipitatum, margine serrato-crenatum inferne longiciliatum, apice obtusum, supra sparse strigulosum virescens (in juventute canum), subtus appresse et brevissime cano-tomentosulum ; segmenta lateralia parva, linear-oblonga, subintegra, 2–8 mm. longa ; petiolus segmentum terminale subaequans, longiciliatus. *Caules* floriferi simplices, 5–15 cm. longi, pilis brevissimis eglandulosis numerosis appressis et pilis longissimis eglandulosis patentibus praediti. *Verticillastra* 3–6-nata, 2–4-flora, in spicam densam ovato-oblongam 2.5–4.5 cm. longam condensata. *Folia floralia* lanceolata, acuminata, 3–5-nervosa, cana, calycibus breviora, saepius tubum \pm aequantia. *Pedicelli* 1–3 mm. longi. *Calyx* tubuloso-infundibularis, 13–14 nervosus, glandulis brevissime stipitatis et ad nervos pilis longis eglandulosis praeditus, \pm ad medium bilabiatus ; labium superius ovatum in dentes 2–2.5 mm. longos anguste lanceolatos acutissimos subaequaliter trifidum ; labium inferius superiore sub-brevius, ad basin in dentes lanceolatos acuminatos acutissimos (sed vix spinulosos) bifidum. *Corolla* caerulea, 21–24 mm. longa, superne pilis brevissimis eglandulosis et pilis longis eglandulosis paucis munita, fere ad medium subaequaliter bilabiata ; tubus intus dense piloso-annulatus ; galea subrecta, 8.5–10 mm. longa, retusa, compressa 4 mm. lata ; labium inferius trilobatum, lobo mediano reniforme integro 8–9.5 mm. lato lobis lateralibus late ovatis obtusissimis $2\frac{1}{2}$ -plo longiore. *Antherae* 2 ; filamentum 5 mm. longum, curvatum ; connectivum ad articulum nodosum minute pilosum, antice geniculatum. *Stylus* 27–30 mm. longus, exsertus. *Nux* ignota.—Floret Jul.—Aug.

Prov. Konya, distr. Ermenek (Cilicia Trachea) : between Hamitseydi Boğ. and Beşkuyu (between Ermenek and Anamur), 1700 m., hillsides, shrub 1–1½ ft. tall, fl. blue, 16 Aug. 1949, Davis 16247 (*typus* in *Herb. Kew.*).

In the diagnosis I have related this species not only to *S. potentillifolia* Boiss. et Heldr. ex Benth., but also to *S. pisidica* Boiss. et Heldr. ex Benth. to which Dr. Huber-Morath (*in litt.*) considers it very closely related. *S. pisidica* is itself very near to *S. potentillifolia* : *Balansa* 1191 (from

Phrygia), though nearer the former, is intermediate between them. *S. potentillifolia* var. *microphylla* Boiss., although growing in the same Lycian locality as *S. potentillifolia*, certainly seems to fall within the specific limits of *S. pisidica*.

S. brevispicata also shows affinities with *S. russegeri* Fenzl ; indeed, it is intermediate in several characters between the latter and *S. potentillifolia*. From *S. russegeri* the new species differs in its smaller greyish stem-leaves, shorter floral leaves that are not roseate, abbreviated spikes, smaller flowers and less acuminate calyx teeth. Heldreich's gathering of *S. russegeri* from Karaman simulates *S. brevispicata* in its small leaves and short inflorescences—characteristics that may be due to an arid environment.

More material of this beautiful but critical group is required from Asia Minor.

Salvia candidissima Vahl, Enum. Pl. 1, 278 (1804).

Prov. Antalya, distr. Gebiz (Pisidia) : Kuzdere in Kozlu D., N. of Bozburun Da., fl. white, 27 Jul. 1949, 15776. Prov. Isparta, distr. Sütçüler (Pisidia) : Sarp Da. above Kuzdere, fallow field, fl. white, 28 Jul. 1949, 15835.

Salvia caespitosa Montbr. et Aucher in Ann. Sc. Nat. Bot. Ser. 2, 6, 39 (1836).

Prov. Antalya, distr. Kemer (Lycia) : Söğüt Cumasi Y. between Teke Da. and Çalbali Da., 1400 m., in rocks, 13 Jul. 1949, 15241 ; Tahtali Da., 2000–2300 m., fl. pale lilac-pink, 10 Jul. 1949, 15056 (*forma foliis floralibus quam calycibus sub-brevioribus*).

Salvia ermenekensis Rech. fil. in Öst. Bot. Zeitschr. 95 (4) 423 (1948).

Prov. Konya, distr. Ermenek (Isauria) : between Ermenek and Balkusan D., 1500 m., marly slopes, fl. blue, 14 Aug., 1949, 16196.

Salvia frigida Boiss., Diagn. Ser. 1 (5) 10 (1844).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., 2200 m., fl. white, 25 Jul. 1949, 15708.

Salvia grandiflora Ettlinger, Salv. 17 (1777).

Prov. Antalya (Lycia) : Çalbali Da., below Tepe Delen Y., 1600 m., 13 Jul. 1949, 15257 ; distr. Kemer (Lycia), Tahtali Da. at Kuzdere Y., common in Pine woods, 8 Jul. 1949, 15132, and Teke Da. near Ovacık, in *Pinetum brutiae*, 1200 m., fl. lilac, 12 Jul. 1949, 15168 & 15341 ; distr. Gebiz (Pisidia), Bozburun Da. between Boğaz Ağzi and Tozlu Çukur Y., fl. mauve, 24 Jul. 1949, 15563 & 15508, and Kozlu D., N. of Bozburun Da., 1200 m., in *Pinus nigra* subsp. *pallasiana* forest, 24 Jul. 1949, 15747. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. between Gökçayır and Atlik Y., 1400–1500 m., in *Ostrya carpinifolia* woods, fl. mauve-blue, 26 Aug. 1949, 16441.

Salvia montbretii Benth. in Ann. Sc. Nat. Bot. Ser. 2, 6, 42 (1836).

Prov. Konya, distr. Ermenek (Isauria) : between Ermenek and Balkusan D., 1500 m., fl. blue, 14 Aug. 1949, 16197.

Salvia napifolia Jacq., Hort. Bot. Vindob. 2, 71 (1772).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da., at Kuzdere Y., 1000 m., edge of field, fl. violet, 8 Jul. 1949, 15130.

The species must have been growing with *S. virgata* Jacq., collected at the same spot in 1947 (*Davis 14082*).

Salvia nemorosa L., Sp. Pl. ed. 2, 35 (1762).

Prov. Antalya (Lycia) : Çalbali Da. at Tepe Delen Y., fl. violet, 13 Jul. 1949, 15247 ; Prov. Isparta, distr. Sütçüler (Pisidia) : Cimen Ov. on W. side of Sarp. Da., fl. violet, 28 Jul. 1949, 15810. Prov. Konya (Lycaonia) : 12 km. W. of Konya, in steppe, fl. violet, 9 Sept. 1949, 16128.

All the Turkish specimens that I have seen have smaller floral leaves than in European material of this species. *No. 16128* differs further from the typical form in having a rather larger corolla with a more strongly curved hood, and leaves that are somewhat lobed—thereby resembling some forms of *S. virgata* L.

Salvia potentillifolia Boiss. et Heldr. ex Benth. in D.C., Prodr. 12, 270 (1848).

Prov. Antalya, distr. Kemer (Lycia) : Teke Da. near Ovacık, in *Pinetum brutiae*, 1100–1200 m., fl. sulphur, 12 Jul. 1949, 15186 (*forma foliis subquinqsectis*).

Salvia sclarea L., Sp. Pl. 27 (1753).

Prov. Isparta, distr. Sütçüler (Pisidia) : Sarp Da. above Kuzdere, fl. mauve, 28 Jul. 1949, 15831.

Satureia cuneifolia Ten., Prodr. Fl. Nap. 33 (1811).

Prov. Konya, distr. Bozkır (Isauria) : Bozkır vadisi, cliffs, 1000 m., fl. white or pale violet, 7 Sept. 1949, 16610 ; distr. Ermenek (Isauria), Ermenek, 1300–1400 m., slopes, fl. white, 13 Aug. 1949, 16156, and in Hamitseydi Boğ. (Cilicia Trachea) between Sarivadi and Beşkuyu, 16 Aug. 1949, 16241 ; Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., 27 Aug. 1949, 16400.

The calyx of this species, though often referred to as actinomorphic, is actually somewhat bilabiate. Many intermediates occur between the typical form and var. *tenuis* Boiss.

Satureia thymbra L., Sp. Pl. 567 (1753).

Prov. Antalya, distr. Kemer (Lycia) : Gönük, 7 Jul. 1949, 15026.

Scutellaria brevibracteata Stapf in Denkschr. Akad. Wiss. Wien, 50, 99 (1885).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da., at Gürleyik Y., 1500 m., 9 Jul. 1949, 15364 ; *ibid.*, 1400 m., 15126.

Scutellaria orientalis L. subsp. **alpina** (Boiss.) O. Schwarz in Fedde, Repert. 36, 134 (1934), *incl.* var. *glandulosissima* O. Schwarz, l.c.

Prov. Antalya (Lycia) : Çalbali Da., above Tepe Delen Y., 1800 m., slopes, 14 Jul. 1949, 15324 ; distr. Kemer (Lycia), Tahtali Da., at foot of N. scree, 2000 m., fl. yellow, 10 Jul. 1949, 15097 ; distr. Gebiz (Pisidia) ; Bozburun Da., N. side, 2200–2300 m., bracts reddish and dentate, fl. yellow, 25 Jul. 1949, 15646. Prov. Isparta, distr. Sütçüler (Isauria) :

Dedegöl Da. above Dedegöl tarn, windy ridge, fl. yellow, 3 Aug. 1949, 16006.

My Pisidian gatherings have bracts that are usually purplish and subdentate—features which distinguish them from the typical form of this subspecies whose bracts are greenish and entire.

The numbers cited above show considerable variation in indumentum. All have glandular and eglandular hairs on the bracts, except for part of 15646 which has only eglandular hairs. The leaves are either covered with eglandular hairs or have the latter mixed with glandular ones. The hairs on the stems are usually entirely eglandular, but in a specimen of mine from Boz Dağ near Acipayam in Caria (13368) the stems are, like the bracts and leaves, densely covered with glandular and eglandular hairs. Indeed, glandular forms of subsp. *alpina* seem to be characteristic of the W. and S.W. Anatolian regions ; such forms have been collected on Samos, and on Nifdağ and Tmolus in Lydia. Part of the original type-series (*Balansa* 327, *Boissier*) from the latter mountain actually has glanduliferous bracts. Elsewhere the forms of *S. orientalis* are usually eglandular, and Handel-Mazetti evidently recognised this when he differentiated *S. tauricola* Hand-Mazz. from *S. orientalis*, s. *stricto*, by the glandular indumentum of the former's leaves and stems.

var. **pinnatifida** Boiss., Fl. Or. **4**, 682 (1879).

Prov. Antalya (Lycia) : Çalbalı Da., above Tepe Delen Y., slopes, 1800 m., 14 Jul. 1949, 15324.

Scutellaria salviifolia Benth., Lab. 433 (1834).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Selköşe and Oruz Gaz Y., on metamorphic slopes, 1200–1400 m., fl. flavous, 1 Aug. 1949, 15903.

Scutellaria subvelutina Rech. fil in Bot. Archiv, **43**, 31 (1941).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da. at Kurucaova, 1800 m., fl. lilac, 25 Jul. 1949, 15906 ; Bozburun Da., near Taşlı Y., 1700 m., fl. lilac with white blotch on lower lip, 25 Jul. 1949, 15554 ; Bozburun Da., between Taşlı Y. and Kozlu D., fl. lavender-blue, 27 Jul. 1949, 15720 ; Prov. Isparta, distr. Sütçüler (Isauria) : Dedegöl Da., between Selköşe and Oruz Gaz Y., 1400 m., metamorphic screes, fl. lilac, 1 Aug. 1949, 15906.

Scutellaria velenovskyi Rech fil. subsp. **perhispida** (Bornm.) Rech. fil. in Bot. Archiv. **43**, 11 (1941).

Prov. Antalya, distr. Kemer (Lycia) : Kesme Boğ. near Kemer, among shady rocks, 8 Jul. 1949, 15145b (*fruct.* ; *forma foliis vix cordatis*).

Scutellaria sp. nov. ? (Sect. *Lupulinaria* Hamil.).

Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ., between Sarivadi and Beşkuyu (between Ermenek and Anamur), corolla flavous, grazed, 16 Aug. 1949, 16234.

The gathering differs from the type of *S. pectinata* Montbr. et Auch. by its smaller leaves with only 6–8 lobules on each side and with the lamina \pm equal to the petiole, and by its shortly crenate-incised bracts bearing glandular hairs. From *S. pinnatifida* Hamil. it is distinguished by its

oblong-lanceolate leaves cut on each side into 6–8 very shortly oblong and very obtuse crenations, and smaller, less cut bracts with a glandular indumentum. The material is very limited and grazed.

A specimen of *S. pectinata* in the Kew Herbarium, collected by Kotte in Cappadocia ("Goreme bei Urgup"), has stems more closely clad with smaller leaves than in the type-gathering of that species.

Sideritis balansae Boiss., Diagn. Ser. 2 (4) 35 (1859).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Taşlı Y. and Kozlu D., annual, fl. lilac, stony hillside, 27 Jul. 1949, 15718. Prov. Denizli, distr. Acipayam (Caria) : Boz Da., 2800 m., 16 Jul. 1947, 13417 (" *S. montana* L. var. *cryptantha* Boiss.", Davis in Kew Bull. 1949 : 420).

Sideritis bilgeriana P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

Species haec affinis *S. hispidae* P. H. Davis sed in omnibus partibus minor ; insuper caulibus tenuissimis inferne subsericeis superne inter verticillastra glanduloso-pubescentibus, foliis caulinis angustissimis nunquam amplexicaulibus subsericeis canescentibus in spinulam serius angustatis minus prominenter nervosis, foliis turionum steriliū sericeis, bracteis minus amplexantibus minus prominenter nervosis brevius cuspidatis, calyce in dentes anguste triangulares (haud lanceolatos) fisso removitur.—A *S. leptoclada* Schwarz et Davis caulibus minus quadrangularibus inferne pilis valde appressis (haud patentibus) praeditis, foliis caulinis tenuioribus haud amplexicaulibus, eis turionum steriliū oblanceolatis sericeis (haud dense lanato-pannosis), bracteis minus amplexantibus textura tenuioribus nervis minus prominentibus, calycis dentibus anguste triangularibus in spinulam paulo longiorem exeuntibus, tubo lanatulo, inter alia differt.

Planta basi suffrutescens, ramis brevibus turiones steriles manifeste stipitatos emittentibus. *Caulēs* floriferi tenuissimi \pm numerosi, 35–50 cm., alti, medio 1 mm. lati, vix quadrangulares, ascendenti-erecti, simplices vel superne subramosi, inferne pilis praesertim longis eglandulosis appressis subsericei, superne inter verticillastra pilis brevibus glandulosis patentibus vel saepe pilis longis eglandulosis commixtis \pm viscoso-pubescentes. *Folia* caulium floriferorum linearia, ad apicem acutissimum in spinulam sensim angustata, pilis longis eglandulosis appressis et glandulis breviter stipitatis molliter subsericea, canescentia, manifeste reticulato-nervosa, inferiora subintegra in petiolum brevem sensim attenuata, 4–5.5 cm. longa, 4–4.6 mm. lata, superiora integerrima sensim diminuta sessilia haud amplexicaulia ; folia turionum steriliū oblanceolata, sericea. *Verticillastra* 2–4-nata, remotissima, inter se 4–7 cm. distantia, 15–20 mm. lata. *Bracteae* vix vel paulo amplexantes, membranaceae, 9–14 mm. longae et latae, orbiculares, ad apicem in cuspidem lanceolatam spinulosam 3–4 mm. longam abrupte angustatae, pilis numerosis brevibus glandulosis patentibus et pilis paucis longis eglandulosis appressis munitae, ad marginem ciliatae, reticulato-nervosae, dentes calycum haud occultantes. *Calyx* infundibulari-tubulosus, 8–10 mm. longus, fauce 3 mm. latus, glandulis breviter stipitatis praeditus, ad $\frac{1}{4}$ – $\frac{1}{3}$ in dentes anguste triangulares villosos in spinulam 1–1.5 mm. longam flavescentem acuminatos fissus. *Corolla* 10–11 mm. longa,

ad $\frac{1}{3}$ bilabiata, flavescens, 2–4 lineis brunneis notata ; labium superius ad medium bifidum, lobis obtusis ; labium inferius trilobatum, lobo mediano orbiculare retuso 3 mm. lato lobis lateralibus ovatis obtusissimis paulo longiore. *Nuculae* oblongo-ovatae, 2.75 mm. longae, 1.75 mm. latae, obtusae, subtriquetae, atrofuscae, laeves.—Floret Aug.

Prov. Konya, distr. Ermenek (Isauria) : Ermenek, 1300–1400 m., chalky slopes, stems many, ascending-erect, corolla flavescent with 2–4 brownish stripes, 13 Aug. 1949, *Davis 16160* (*typus in Herb. Kew.*) ; montagne au pied d'Ermenek, Aug. 1872, *Péronin 174* (" *S. libanotica* Lab. var. *linearis* Benth.", Boiss., *Fl. Or.* **4**, 712 : 1879).

In addition to characters cited in the diagnosis, *S. bilgeriana* differs from *S. hispidula* by the presence of appressed eglandular hairs on the bracts, the softer indumentum of the calyx teeth, and the more deeply coloured corolla. It also has affinities with *S. libanotica* Lab. s. lato, a species apparently represented in Isauria only by subsp. *violascens* (Davis) Davis. It differs from the latter, and from the Taurus subsp. *linearis* (Benth.) Bornm. emend. Davis (*vide infra*), by its subterete stems with their distinctive indumentum, subsericeous stem-leaves that are always very narrow, entire, and taper more gradually into a very acute spiny point, sericeous sterile shoots, and calyx with a glandular, non-lanate tube bearing broader, shorter, spine-tipped teeth.

I have named this species after my friend and botanical assistant in Turkey, Mr. Kâmil Bilger.

Sideritis brevidens P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

Species haec valde affinis *S. argyreae* P. H. Davis sed calyce fauce vix obliquo ad $\frac{1}{6}$ – $\frac{1}{4}$ in dentes breviores subaequales ovato-triangulares brevius spinulosos ; insuper foliis minoribus, indumento caulium et bractearum brevioribus minus glandulifero, verticillastris minus remotis, bracteis minoribus paulo brevius cuspidatis, floribus minoribus divergit.

Suffrutex e ramis ascendentibus vix tortuosis compositus. *Caules* floriferi erecti, 20–40 cm. alti, simplices vel aliquando subramosi, teretes, medio 1–1.5 mm. lati, dense foliati, inferne pilis longis eglandulosis et glandulis stipitatis subappresse hirsuti, canescentes, superne inter verticillastra pilis brevibus numerosis eglandulosis firmis et glandulis paucis subsessilibus scabri. *Folia* caulina anguste oblongo-ovata, basi truncata, apice acuta mucronulata, margine minute crenata, densissime sericea, pilis nervaturam occultantibus argentea, distincte et breviter petiolata sed summa sessilia, mediana 2.5–3.5 cm. longa, 9–12 mm. lata, internodiis saepius duplo longiora, inferiore gemmis sericeis manifeste notata. *Verticillastra* 3–10-nata, 2–4 (5) cm. distantia, 13–20 mm. lata. *Bractee* late orbiculares, membranaceae, amplexantes, 12–15 mm. longae, 12–17 mm. latae, apice in cuspidem 1.5–3 mm. longam abrupte angustatae, pilis brevissimis tenuibus eglandulosis et glandulis subsessilibus \pm velutinae, margine ciliatulae, nervis haud valde prominentibus. *Calyx* 7–8 mm. longus, ore vix obliquus, vix striatus, pilis brevibus glandulosis dense munitus, ad $\frac{1}{6}$ – $\frac{1}{4}$ in dentes subaequales ovato-triangulares brevissime spinulosos breviter hispidulo-villosos fissus. *Corolla* 11 mm. longa, pallide citrina, vix lineis notata, etiam ad $\frac{1}{3}$ bilabiata, superne brevissime tomentosa ; labium superius fere ad $\frac{1}{3}$ bifidum, lobis obtusis ;

labium inferius trilobatum, lobo mediano transverse elliptico, 2mm. longo, 3.5 mm. lato, margine sinuato, lobis lateralibus brevioribus ovatis obtusissimis. *Nuculae* ovato-oblongae, 2–2.5 mm. longae, 1–1.25 mm. latae, obtusae, subtriquetrae, atrofuscae, laeves.—Floret Jul.—Aug.

Prov. Mersin, distr. Gülnar (Cilicia Trachea) : Bozağaç, near Gülnar, open chalky slopes, flowers pale lemon-yellow, scarcely lined, 20 Aug. 1949, *Davis 16358 (typus in Herb. Kew.)*.

S. brevidens is certainly very closely related to *S. argyrea* P. H. Davis (in Kew Bull. 1949 : 416), discovered in Pine woods further west in the Isaurian Taurus ; when more material becomes available it is possible that it may have to be considered a subspecies of the latter. Some of the *differentiae* given in the diagnosis of *S. brevidens* may be attributable to environment, but the difference in the form of the calyx can scarcely be so explained. *S. argyrea* has lanceolate teeth that end in a longer spine than in *S. brevidens* ; in particular, the mouth of the calyx is markedly oblique, the length of the teeth being so unequal that the posterior tooth is considerably longer than the others ; but in *S. brevidens* the mouth of the calyx is only very slightly oblique, and the much shorter teeth are subaequal. My gatherings of *S. argyrea* show very little calyx-variation, and the same applies to ample material of the related *S. cypria* Post ; it would therefore seem that calycine characters are here of considerable diagnostic value. No related species has yet been collected in the region between the areas of *S. argyrea* and *S. brevidens*. The two plants are well distinguished from all others in the section by the form of their petioled cauline leaves.

It might be added that the calyx of *S. cypria* resembles that of *S. cilicica* Boiss. et Bal., from which the former differs markedly in habit, indumentum of stem and leaves, and leaf-shape.

***Sideritis condensata* Boiss. et Bal. var. *subremota* P. H. Davis, var. nov.**

A typo caulibus elatis 60 (100) cm. altis saepius magis ramosis, verticillastris inferioribus remotis sed superioribus congestis, bracteis et calycibus sparse araneoso-pubescentibus (haud appresse villosulis) recedit.

Prov. Isparta, distr. Sütçüler (Pisidia) : between Tota Beyli Y. (on Kuyucuk Da.) and Daribükü, bushy metamorphic slopes, \pm erect, fl. lemon-yellow, 30 Jul. 1949, *15895* ; Prov. Antalya, distr. Gebiz (Pisidia) : Kuzdere in Kozlu D. (N. of Bozburun Da.), 1100 m., between limestone rocks, up to 1 m. tall, fl. lemon-yellow, 27 Jul. 1949, *Davis 15741 (typus in Herb. Kew.)*.

The new variety resembles the type in its erect habit, and var. *procumbens* (Boiss. et Heldr.) Boiss. in its interrupted spikes. My two gatherings are very similar, indicating that the variety has a geographical basis.

***Sideritis congesta* Davis et Huber-Morath, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).**

Species haec affinis *S. condensatae* Boiss. et Heldr. sed bracteis (infimis plerumque serratis) majoribus magis orbicularibus calyces fere occult-

antibus nervatura valde prominentibus ; insuper habitu suffruticosiore divergit.

Planta suffruticosa, ramis tortuosis inferne breviter subrepentibus. *Caules* floriferi erecti, simplices, 25–50 cm. alti, pilis longis eglandulosis dense albo-lanati, prope basin 2–2.5 mm. lati, turiones steriles foliis obovatis parvis dense bombycinis emittentes. *Folia* caulina (summa ovata latiora exclusa) anguste oblongo-lanceolata, sessilia, haud perfoliata, apice acuta margine argute serrata (serraturis vix 1 mm. longis acutis), 1.5–2.5 cm. longa, 5–7 mm. lata, inter se 3–5 cm. distantia, prominenter reticulato-nervosa, araneoso-lanata. *Verticillastra* plerumque 5–12-nata, decussata, imbricata, in spicam valde farctam (vel verticillastrum infimum nunc subdistans) ovato-oblongam, 2.5–6 cm. longam, 2.5–2.7 cm. latam, coarctata. *Bractae* calyces fere occultantes, late orbiculares, basi truncatae, apice in cuspidem 3 mm. longam acutissimam abrupte angustatae, medianae 14–16 mm. longae et latae, margine molliter ciliatae, extus praesertim ad nervos valde crassos reticulatos araneoso-pilosaе, glandulis sessilibus sparse praeditae, infimae in parte superiore plerumque argute serratae, caeterae integrae, in fructu flavescens indumento subdeciduo. *Calyx* tubulosus, \pm 10 mm. longus, indistincte nervosus, ad $\frac{1}{3}$ – $\frac{1}{2}$ in dentes anguste lanceolatos acutissimos subaequales rectos eglanduloso-lanatos fissus, tubo inferne pilis praesertim brevibus glandulosis viscoso-pubescente, superne pilis brevibus glandulosis et longis eglandulosis viscidulo-lanato. *Corolla* flavescens, brunneo-lineata, 12–13 mm. longa, ad $\frac{1}{4}$ – $\frac{1}{3}$ bilabiata, superne extus pubescens ; labium superius bifidum inferiore trilobulato sublongius. *Nuculae* ovatae, obtusae, 1.75–2 mm. longae, 1–1.525 mm. latae, fuscae, subnitidae, praesertim inferne breviter papilliferae.—Floret Mai.–Jun.

Prov. Antalya, distr. Alanya (Isauria) : Beydam (near Geyik Da.), 1000 m., cultivated, 26 Aug. 1947, *Davis 14294* (“*Sideritis* aff. *condensatae* Boiss. et Heldr.”, Davis in Kew Bull. 1949 : 421) ; distr. Manavgat (Isauria), between Akseki and Manavgat, *macchia* 29 km. S. of Akseki, 470 m., 20 June 1948, *A. Huber-Morath 8272*, *H. Reese*, and 47 km. S. of Akseki, 250 m. in *Pinetum brutiae*, 20 June 1948, *A. Huber-Morath 8271*. Prov. Mersin, distr. Anamur (Cilicia Trachea) : roches près Anamur, May 1872, *Péronin 70* (*typus* in *Herb. Kew.*—“*S. condensata* Boiss. et Bal. var. *procumbens* (Boiss. et Bal.) Boiss.”, Boiss., Fl. Or. **4**, 713 : 1879) ; Kükür valley between Kükür (above Anamur) and Saridana, 500–700 m. in open *Pinetum brutiae* on calc. and metamorphic rocks, erect, woody, corolla flavescent, with brown lines on both lips, 19 Aug. 1949, *Davis 16327* ; Kükür (above Anamur), 700 m., 18 Aug. 1949, *Davis 16339*.

The ecology and woody habit of *S. congesta* are like those of *S. lycia* Boiss. et Heldr. The form of the bracts, however, suggest that the new species is most closely related to *S. condensata* Boiss. et Bal. ; but the bracts of the latter are smaller, less orbicular, and much less strongly nerved than in *S. congesta*, giving the spikes of the two species a very different appearance.

Sideritis erythrantha Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 438 (1848).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Cukur Y., scree slopes in Black Pine forests, fl. purple,

24 Jul. 1949, 15507 ; Kozlu D., N. of Bozburun Da., fl. violet-purple, 27 Jul. 1949, 15746.

In both gatherings the indumentum is denser than in the type—probably an environmental modification. *S. erythrantha* var. *cedretorum* P. H. Davis (in Kew Bull. 1949 : 418) should perhaps be given sub-specific rank now that the typical violet-flowered form of the species is better known ; in addition to the differential characters given in the diagnosis of var. *cedretorum*, the indumentum in the lower part of the stem is somewhat glandular.

Sideritis hispida P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

Species haec affinis *S. bilgeriana* P. H. Davis sed in omnibus partibus major ; insuper caulibus inferne hispidis superne scabris, foliis caulium floriferorum hispidis viridibus pro porportione latioribus crassius nervosis apice abruptius angustatis, superioribus amplexicaulibus, foliis turionum steriliū vix sericeis, bracteis magis amplexicantibus manifestius nervosis cuspidē longiore munitis, calyce graciliore in dentes lanceolatos fisso differt.—A *S. perfoliata* L. caulibus simplicibus tenuioribus inter verticillastra haud hispidis, foliis angustioribus minus amplexicaulibus, verticillastris semper remotissimis, bracteis in cuspidē breviorē tenuiorē ocius angustatis, calyce fauce latiore, dentibus patenter hispidulo-villosis apice distincte spinulosis, inter alia recedit.

Suffrutex muticaulis, robustus, basi turiones steriles stipitatos emittens. *Caules* floriferi erecti, simplices, flavescentes, 45–80 cm. alti, medio 1.5–2 mm. lati, subquadrangulares, inferne pilis longis rigidis patentibus eglandulosis et pilis brevissimis glandulosis hispidi, superne inter verticillastra pilis brevibus crassiusculis eglandulosis et pilis brevissimis glandulosis \pm scabri. *Folia* caulium floriferorum firma, viridia, acuta, spinulo terminata, glandulis breviter stipitatis et pilis longis rigidis eglandulosis (subtus ad nervos reticulatos valde prominentes collectis) hispida, inferiora anguste oblongo-oblancoolata plerumque dentato-serrata in petiolum brevem sensim attentuata, 4–8 cm. longa, 7–11 mm. lata, superiora anguste oblongo-lanceolata sessilia \pm amplexicaulia sub-integra sensim diminuta ; folia turionum steriliū oblancoolata petiolata appresse sed vix mollissime subsericeo-villosa, canescentia. *Verticillastra* 3–10-nata, remotissima, inter se 4–8 cm. distantia, 2–3 cm. lata. *Bractee* late orbiculares, basi truncatae, apice in cuspidē anguste lanceolatam acutissimam spinuloso-terminatam (3) 4–7 mm. longam abrupte contractae, membranaceae, manifeste amplexantes, 15–18 mm. longae, 14–17 mm. latae, manifeste reticulato-nervosae, glandulis breviter stipitatis margine ciliato excluso oblectae, dentes calycum vix occultantes. *Calyx* infundibulari-tubulosus, 10–11.5 mm. longus, fauce 3.5–4 mm. latus, glandulis numerosis breviter stipitatis munitus, ad $\frac{1}{3}$ in dentes lanceolatos \pm patenter hispidulo-villosos (in spinulam 1–1.75 mm. longam flavescentiam aliquantum abrupte acuminatos) fissus. *Corolla* 13–14 mm. longa, ad $\frac{1}{3}$ bilabiata ; labium superius albidum, purpurascens-lineatum, fere ad medium in lobos subobtusos bifidum ; labium inferius pallide citrinum, purpurascens-lineatum, trilobatum, lobo mediano late orbiculare sinuato 4–5 mm. lato lobis lateralibus ovatis obtusis longiore. *Nuculae* ovatae, obtusae, 2.5 mm. longae, 1.75 mm. latae, subtriquetae, laeves, atrofuscae, subnitidae.—Floret Aug.–Sept.

Prov. Konya, distr. Bozkir (Isauria) : Bozkir vadisi, 1100 m., open steep calc. slopes, erect, tall, unbranched, fl. pale lemon-yellow, the upper lip nearly white, but with purplish brown veins on both lips, 7 Sept. 1949, *Davis 16617* (*typus in Herb. Kew.*) ; *ibid.*, 2 Sept. 1947, 14583 (*fruct.*—" *Sideritis* aff. *perfoliatae* L.", Davis in Kew Bull. 1949 : 422).

The new species is evidently closely related to *S. bilgeriana* P. H. Davis, a plant which is found further east in the same type of habitat at the junction of the Mediterranean and Irano-Turanian phytogeographical regions. *S. hispida* can be readily distinguished from the latter species by its larger size, hispid indumentum (the hairs being much thicker), and different leaf-shape—characters which also differentiate it from *S. libanotica* Lab., *s. lato*.

It also shows affinities with *S. perfoliata* L. (see below), a species widespread in the Levant in areas with a Mediterranean climate. In the diagnosis of *S. hispida* I have differentiated it from the *typical form* of *S. perfoliata* occurring in Turkey and Cyprus.

Sideritis hololeuca Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 438 (1848).

Prov. Konya, distr. Karaman (Isauria) : Sofur Ça. near Afghan, on road between Karaman and Ermenek, large woody sp. like *S. lycia* in habit, up to 0.8 m. in diameter, fl. dirty yellowish-fawn with 4 brown lines on upper lip, 12 Aug. 1949, *16134*. Prov. Konya, distr. Ermenek (Cilicia Trachea) : Sarivadi (S. of Ermenek), hillsides, very shrubby, fl. pale yellowish with brown lines, 16 Aug. 1949, *16230*.

This excessively felted species, discovered in the same part of the Isaurian Taurus by Heldreich, is marked off from all other species in Sect. *Empedoclea* less by the form of its inflorescence than by its sub-orbicular leaves.

Sideritis libanotica Lab., Ic. Pl. Syr. **4**, 13 : 1812, subsp. **libanotica** (*S. libanotica* var. *genuina* Bornm. in Mag. Bot. Lap. **31**, 139 : 1932.)

Folia serrulata. *Bractae* valde reticulato-nervosae, firmae, vix membranaceae, haud amplexantes. *Calyx* ad $\frac{1}{5}$ — $\frac{2}{3}$ in dentes triangula es \pm abrupte mucronatos fissus. *Corolla* citrina.

Typus : in Libano, Labillardière !

subsp. **linearis** (Benth.) Bornm. emend. Davis. (*S. libanotica* Lab. var. *linearis* Benth. in DC., Prodr. **12**, 440 : 1848. *S. lib.* subsp. *ambigua* Fenzl (pro spec.) ex Bornm. in Mag. Bot. Lap. **31**, 139 : 1932. *S. gracilis* Barbey in Bull. Soc. Vaud. Sc. Nat. **21**, 224 : 1855. *S. lib.* subsp. *linearis* (Benth.) Bornm. var. *magis-incana* Boiss. (pro var. *S. ambiguae* Fenzl) ex Bornm. in Mag. Bot. Lap. **31**, 140 : 1932.)

Folia subserrulata, ea turionum steriliū semper \pm lanata. *Bractae* indistincte nervosae, textura tenues, quam in subsp. *libanotico* latiores, \pm membranaceae, subamplectantes. *Calyx* ad $\frac{1}{3}$ — $\frac{2}{5}$ in dentes triangulari-lanceolatos acutos vix mucronatos fissus. *Corolla* citrina.

Prov. Antalya (Lycia) : Çalbali Da., below Tepe Delen Y., 1600 m., open slope, fl. yellow, 13 Jul. 1949, *15256* ; Çalbali Da., near Fesliken Y., 1800 m., side of gulley, 14 Jul. 1949, *15361* ; Söğüt Y. near Sivri Da., 1300 m., 16 Jul. 1949, *15432* ; distr. Kemer (Lycia), Teke Da. at Ovacik,

1100 m., edge of plain, fl. lemon-yellow, 12 Jul. 1949, 15185 ; distr. Gebiz (Pisidia) : Bozburun Da., N.E. side, 25 Jul. 1949, 15674. Prov. Konya (Lycaonia) : 15 km. W. of Konya, in calc. steppe (hard limestone) on Konya-Beyşehir road, erect, fl. large, bright clear lemon-yellow, unlined, 9 Sept. 1949, 16132. Prov. Niğde, distr. Ulukışla (Cilicia) : near Alihoca at N. foot of Bulgar Da., 1300 m., stony slope, 3 Sept. 1949, 16533.

subsp. **violascens** (Davis) Davis, comb. nov. (*S. violascens* P. H. Davis in Kew Bull. 1949 : 421.)

Corolla purpureo-violacea.

Prov. Konya, distr. Ermenek (Isauria) : N. side of Balkusan D. (between Karaman and Ermenek), dominant on rocky N. slope, much grazed, fl. violet-purple, 14 Aug. 1949, Davis 16191 ; Ermenek, Péronin 175 ; between Hamitseydi Boğ. and Beşkuyu (Cilicia Trachea) in rocky places, fl. purple, 16 Aug. 1949, Davis 16250.

Since discussing this species in Kew Bull. 1949 : 419, I have been able to examine the holotype of *S. libanotica* Lab. in the Florence Herbarium and to study that species further in Turkey. As a result, I recognise three major subspecies of *S. libanotica* : *libanotica*, *linearis* and *violascens*. In its typical form, subsp. *libanotica* is confined to the Lebanon, but may include var. *cana* Boiss., the type of which I have not seen but to which an Antilebabanon gathering (Davis 9972) may belong. Subsp. *linearis* is widespread in S. Anatolia, being represented by a large number of local races which resemble each other in calyx-shape (the teeth being longer and less muticous than in subsp. *libanotica*), but differ in habit, leaf-shape and the density of their indumentum ; these forms might be given varietal names within the subspecies, but would be difficult to delimit. One of the most distinct is Davis 16132, a steppe population with unusually large bright flowers and wide lanate leaves. Having collected more material of *S. violascens* P. H. Davis, I now consider it a subspecies of *S. libanotica* ; it resembles certain forms of subsp. *linearis* but for its violet (not lemon-yellow) flowers. Subsp. *violascens* divides the range of subsp. *linearis* into two parts, and occupies an area of the Isaurian Taurus and adjacent Cilicia Trachea where no other form of *S. libanotica* has been found, records given by Boissier being referable to *S. bilgeriana* Davis or to *S. arguta* Boiss. et Heldr.

I am undecided about the position of *f. amani* Bornm. (*l.c. supra*) which has only been collected in the Amanus by Kotschy ; it might stand as an independent subspecies linking subsp. *linearis* to subsp. *libanotica*, or could be treated as a variety of the latter. Lack of sufficient material from the Lebanon makes the circumscription of subsp. *libanotica* difficult.

Sideritis lycia Boiss. et Heldr. apud Benth. in D.C., Prodr. 12, 438 (1868).

Prov. Antalya, distr. Kemer (Lycia) : Gönük, 50 m., on rocks in *Pinus brutia* forest, forming a shrub up to $\frac{1}{2}$ m. tall, very woody, 7 Jul. 1949, 15038 (*forma verticillastris omnibus in capitulum ovatum condensatis*).

Sideritis montana L., Sp. Pl. 575 (1753).

Prov. Antalya, distr. Kemer (Lycia) : Teke Da. at Ovacik, cornfield weed, 12 Jul. 1949, 15204. Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp Da., 28 Jul. 1949, 15800.

Sideritis nusairiensis Post in Bull. Herb. Boiss. Ser. 1, 1, 29 (1893).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da. near Atlik Y., 1700–1800 m., exposed mountainside facing S., fl. lemon-yellow with very thin brownish-purple lines, grazed, 26 Aug. 1949, 16376 ; Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., in a steep gully, fl. pale lemon-yellow with 2 very faint brownish lines on upper lip, 27 Aug. 1949, 16408 ; Dildil Da., above Atlik Y., 2000–2100 m., 27 Aug. 1949, 16437—Det. Burtt et Davis.

S. nusairiensis was originally related by Post (*l.c. supra*) to *S. libanotica* Lab., though it is actually very close to *S. syriaca* (endemic to Crete) and *S. euboea* Heldr. Davis 16408 (on account of its more lax indumentum and habit) looks superficially distinct from the isotypes of *S. nusairiensis* in the Herbaria of Kew and the British Museum, but other gatherings from more exposed situations on the same mountain show it to be a habitat form. Nevertheless, all the Dildil Dağ plants have slightly larger and more pointed bracts than the isotype of *S. nusairiensis* from the Nusairy Mountains in N.W. Syria ; they are also of dwarfer stature, with the stem-leaves more closely set. But Haradjian 432 from “Amanus” links my gatherings to the Nusairy plant ; the latter needs re-collecting with notes on its habitat. The calyx-teeth are rather variable in Amanus material, some Dildil Dağ plants having teeth as short as in the type of *S. nusairiensis*, others as long as is usual in *S. syriaca* and *S. euboea*. *S. nusairiensis* seems most closely related morphologically to the Aegean *S. euboea*, from which it differs only in its more slender stems, rather smaller whorls and longer petioles.

Overlap occurs in all the differential characters used to separate *S. syriaca*, *S. sicula* Ucria ex Guss., *S. euboea* and *S. nusairiensis*. The *differentiae* are of an indefinite quantitative nature, and one is tempted to reduce these plants to geographical subspecies of *S. syriaca*. But without a thorough revision of the group this would seem inadvisable, because of the difficulty in drawing a line between the *S. syriaca* complex and other closely related species. The problem is how to select the nuclei round which subspecies can be centred.

Sideritis perfoliata L., Sp. Pl. 575 (1753). (*S. glandulifera* Post in Bull. Herb. Boiss. Ser. 1, 1, 30 : 1893.)

Prov. Konya, distr. Ermenek (Isauria) : Göksu D. between Ermenek and Sarivadi, 1000 m., marly slopes, 15 Aug. 1949, 16202. Prov. Mersin, distr. Gülnar (Cilicia Trachea) : Kizilyokuş D. near Bozağaç (near Gülnar), 20 Aug. 1949, 16357. Prov. Adana, distr. Karaisah (Cilicia) : between Gülek Boğ. and Pozanti, very eroded bare slopes, 31 Aug. 1949, 16475.

The gatherings all belong to the typical form of the species occurring in Anatolia and Cyprus. *S. perfoliata* is certainly closely related to *S. pullulans* Vent. (of which I have only seen typical material from Palestine), and with which Post (Flora of Syria, Palestine & Sinai, revised edition, 2, 375 : 1933) seems to have confused it. In Lebanon and Palestine *S. perfoliata* shows a much greater range of variation than elsewhere, especially in habit, indumentum and leaf-shape ; indeed, in that area the typical form of the species seems to be scarce. In the Bscherre valley, forms occur with simple, scabrous (or crisply tomentose)

tall stems and extremely remote whorls. It is possible that at least one undescribed species is involved, but more material and field notes are required. Gatherings intermediate between *S. perfoliata* and *S. pullulans* suggest that hybridization has occurred between these two species, and even the possibility of hybridisation with *S. libanotica* Lab. subsp. *libanotica* may have to be considered.

A specimen in the Kew Herbarium, collected by Post at "M'kes", is probably an isotype of *S. perfoliata* L. var. *gadarensis* Post; it seems to be a variant of *S. pullulans*.

Sideritis pisidica Boiss. et Heldr. apud Benth. in D.C., Prodr. **12**, 440 (1848) var. **pisidica**.

Prov. Antalya (Lycia): Çalbali Da., E. side, 2000–2100 m., grazed [collected for me by shepherds], 15 Jul. 1949, 15292.

var. **termessi** P. H. Davis, var. nov.

A typo foliis glandulis breviter stipitatis densius praeditis, verticillastris subminoribus, bracteis paulo minus membranaceis sed magis glanduliferis, corolla lactea (haud citrina) divergit.

Prov. Antalya (Pisidia): Termessus, 400–600 m., flowers creamy white with two purplish brown veins on upper lip, 19 Jul. 1949, Davis 15461 (*typus in Herb. Kew.*); *ibid.* 600 m., in *Quercetum*, 11 Aug. 1947, 13947.

In this variety the length of the leaves varies from 3 to 6 times the width, as it does in the typical form that apparently grows at higher elevations than the Termessus population. The variety makes a particularly good tea.

Sideritis stricta Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 441 (1848).

Prov. Antalya (Pisidia): Termessus, 300 m., local, 19 Jul. 1949, 15451.

Stachys aleurites Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 472 (1848).

Prov. Antalya (Lycia): between Çakırlar and Söğüt Y., near the foot of Sivri Da., crevices of sloping rock, erect, 16 Jul. 1949, 15439.

Stachys amanica P. H. Davis, nom. nov. (*S. debilis* Bornm. in Notizbl. Kön. Bot. Gart. Berlin, **7**, 35 (1917); *nec S. debilis* Humb. et Kunth, Nov. Gen. et Sp. **2**, 309 (1817), *nec S. debilis* Baker in J. Linn. Soc. (Bot.) **20**, 234: 1883.)

Prov. Adana, distr. Bahçe (Amanus): Dildil Da., between Başkonuş Y. and Hüseyin Oluk Çe., rocks, 27 Jul. 1949, Davis 16387; Dildil Da., 1600–2200 m., Jul. 1908, Haradjian 2338. *Det. e descr.*

The two gatherings differ in the length of the calyx-teeth, the teeth in mine being $\frac{1}{3}$ the length of the tube, and in Haradjian's $\frac{1}{4}$ – $\frac{1}{5}$. K. H. Rechinger (Svensk. Bot. Tidskr. **43** (1) 41: 1949), in his key to *Stachys* Subsect. *Infrarosulares* Boiss., states that in this species (under the name *S. debilis* Bornm.) glandular hairs are copiously mixed with the long eglandular ones; but, in the two gatherings which I have referred to *S. amanica*, there are only copious sessile glands among the eglandular

hairs. They differ from Bornmüller's original description in having more numerous rosette leaves, and somewhat smaller calyces.

All gatherings from the Amanus area attributed by Dinsmore (in his revised edition of Post's Flora of Syria, Palestine and Sinai : 1933) to Bornmüller were actually collected there by Ina Meincke (cf. Bornmüller in Notizbl. Kön. Bot. Gart. Berlin, **7**, 1 : 1917). Bornmüller has equated Meincke's "Harunje", in her gatherings (including that of *Stachys amanica*) labelled "Harunje-Alexandretta", with "Ain el Haramije" near Alexandretta, but it seems possible that this locality may be Haruniye above which rises Dildil Dağ.

Stachys bombycina Boiss., Diagn. Ser. 1 (12) 79 (1853).

Prov. Antalya, distr. Kemer (Lycia) : Gönük (N. of Kemer), 10–15 m., in crevices of sloping limestone rocks, 7 Jul. 1949, 15015 (*forma bracteis vix acuminatis*).—Seen also at Kesme Boğaz near Kemer.

I am indebted to Dr. A. Weibel for comparing this gathering with the type of the species at Geneva ; he reports that it differs from the latter only in its bracts being scarcely acuminate. It seems very probable that Pestalozza discovered this species in Lycia or Pamphylia, where he collected other new species, and not in "Syria" as he (or Boissier) maintained. *S. bombycina* has never been re-collected in Syria (in the modern sense) or in Lebanon, although a *Stachys* occurs near Beirut (Ehrenberg 329) and Nahr el Kelb (*J. Ball* 2373, *Davis* 6083) that has woolly, almost eglandular calyx-teeth approaching those of *S. bombycina* ; it must, however, be considered a local race of *S. distans* Benth. and is linked to the typical form of the latter by intermediate gatherings.

S. bombycina, although having its area in Lycia adjacent to that of *S. aleurites* Boiss. et Heldr. in the same subsection, is more closely related to *S. distans* from Lebanon and N. Palestine than to *S. aleurites*.

Stachys x **burrii** P. H. Davis, hybr. nov. (= *S. cretica* L. subsp. *mersinaeae* Rech. fil. x *S. sericantha* P. H. Davis.)

A *S. cretica* L. subsp. *mersinaeae* Rech. fil. indumento sparsiore, verticillastris paucifloris, bracteis et foliis floralibus muticis, floribus minoribus, calyce 9 mm. longo magis infundibulare sub-bilabiato glandulifero, corolla minore recedit.

A *S. sericantha* P. H. Davis indumento densiore minus glanduloso, foliis floralibus brevius muticis vix petiolatis, verticillastris densioribus, floribus paulo numerosioribus, calyce haud crassinervoso magis villosulo minus bilabiato differt.—Nuculae adsunt sed grana pollinis ut videtur abortiva.

Prov. Antalya, distr. Kemer (Lycia) : Teke Da. near Ovacik, 1100–1200 m., 12 Jul. 1949, *Davis* 15174b (*typus in Herb. Kew.*).

The hybrid was collected with *S. cretica* subsp. *mersinaeae*, but *S. sericantha* was growing nearby. The nutlets are fully developed. I have named the plant after Dr. Malcolm Burr, zoologist and traveller, who accompanied me in the Lycian Taurus until severe illness forced a retreat.

Stachys citrina Boiss. et Heldr. apud Benth. in DC., Prodr. **12**, 490 (1848).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., near the cirque Aniçi, 2100 m., among rocks, fl. lemon-yellow, 2 Aug. 1949, 16063 ; Dedegöl Da., above Oruz Gaz Y., 2200 m., screes and stony slopes, fl. lemon-yellow with 2 thin, purplish-brown lines on upper lip, 2 Aug. 1949, 15962.

Stachys cretica L. subsp. **mersinaeae** Rech. fil. in Ann. Nat. Hofmus. Wien, 48, 176 (1937).

Prov. Antalya (Lycia) : Çalbalı Da., at Çukur Ardiç Y., 1600–1700 m., 15 Jul. 1949, 15387 ; distr. Kemer (Lycia), Teke Da. near Ovacık, 1100–1200 m., 12 Jul. 1949, 15174a. Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Beşkuyu and Çamurlu Y. (between Ermenek and Anamur), fallow hollows, fl. purple, grazed, 17 Aug. 1949, 16271 (*forma dentibus calycis rotundato-triangularibus breviter mucronatis*). Prov. Isparta, distr. Sütçüler (Pisidia) : Sarp Da., above Kuzdere, 1300 m., open places in Black Pine forest, 28 Jul. 1949, 15832 (*forma calyce glandulis stipitatis conspicue praedito*).

Stachys euadenia P. H. Davis, sp. nov. (Subsect. *Fragiles* Boiss. emend. Rech. fil.).

Affinis *S. pinardi* Boiss. sed foliis brevissime petiolatis ovatis (haud ovato-orbicularibus) crenulis parvis numerosioribus magis rotundatis munitis inter alia differt.—A *S. fragillima* Bornm. petiolis et foliis floralibus brevioribus, bracteis et bracteolis nullis, floribus fere duplo minoribus, calycis dentibus triangularibus brevius acuminatis, nuculis anguste ovatis acutis vix alato-marginatis valde recedit.

Planta basi indurata, lignescens, e rupibus verticalibus umbrosis dependens, suaveolens. *Indumentum* caulium et foliorum et pedicellorum patens, e pilis brevissimis glandulosis valde numerosis et pilis longis eglandulosis hispidulis (sed ut videtur viscidulis) minus numerosis compositum. *Caules* floriferi decumbentes, 12–30 cm. longi, medio 1 mm. lati, subteretes, simplices vel superne ramosi. *Folia* caulina brevissime petiolata, 3–5 cm. distantia ; lamina late ovato-orbicularis, obtusa, basi cordata, 2·9–4 cm. longa, 2·6–3·8 cm. lata, utrimque 8–13-dentato-crenata, crenis late triangularibus obtusiusculis ; petiolus 0·5–5·0 mm. longus. *Folia floralia* caulinis similia, sed subsessilia, diminuta, inferiora basi truncata, crenis paucioribus subacutis, calyces superantia, superiora basi cuneata, elliptica, acute subdentata vel integra, breviter acuminata, calyce breviora. *Verticillastrae* 1–6-nata, 2–6-flora, racemum laxiusculum 3–10 cm. longum formantia, inferiora 1·5–5 cm. distantia, superiora approximata. *Bractee et bracteolae* nullae. *Pedicelli* 1–2 mm. longi. *Flores* gynodioici. *Calyx* infundibularis, 6–7 mm. longus (fructu ad 8 mm. longus), indistincte nervosus, pilis longis eglandulosis et pilis brevibus glandulosis minus numerosis hispidulus, ore paulo obliquus, ad $\frac{1}{4}$ – $\frac{1}{3}$ in dentes triangulares breviter acuminatos rectos vel subpatentes vix spinulosos fissus. *Corolla* roseo-purpurea, ♀ 12 mm. longa, ♂ 15–17 mm. ; tubus circ. 1·5 mm. latus, extus sparse et brevissime pubescens, ♀ 6 mm. longus, ♂ 9–11 mm. ; labium superius 4 mm. longum, ellipticum, apice obtusissimum 3–4-subcrenatulum, concavum ; labium inferius trilobatum, 6 mm. longum, lobo mediano transversim elliptico-orbiculare 3 mm. longo, 4·5–5 mm. lato, subintegro, lateralibus late

oblongis obtusissimis duplo longiore. *Stamina* ♀ abortiva, ♂ 2 mm. longa ; antherae cordatae, vix 1 mm. longae. *Nuculae* anguste ovatae, 3 mm. longae, 1.25 mm. latae, subtriquetae, vix alato-marginatae, basi obtusae sed breviter apiculatae, apice acutae, fuscae.—Floret Jul.—Aug.

Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ. between Sarivadi and Beşkuyu, in crevices of very shady, vertical, sheltered rocks, stems pendulent-decumbent, brittle, very aromatic, fl. rosy purple, 16 Jul. 1949, *Davis 16228* (*typus in Herb. Kew.*).

Dr. A. Weibel has very kindly compared *S. euadenia* with the type of *S. pinardi* Boiss. at Geneva, and his notes and tracings have left me in no doubt that the new species is closely related to that plant. In addition to marked differences in leaf-shape, the Carian *S. pinardi* apparently differs from *S. euadenia* in having obtuse floral leaves, calyces with fewer glandular hairs, and, according to Boissier, white corollas ; in *S. pinardi* the petioles can be as much as 3.5 cm. long. The new species also shows some affinities with *S. fragillima* Bornm. from Kurdistan, but is less closely related to the cavernicolous *S. longiflora* Boiss. et Bal., the only species in Subsect. *fragiles* Boiss. emend. Rech. fil. (in Bot. Jahr. **71** (4) 526 : 1941) previously recorded from the Taurus. In this group of species useful diagnostic characters can be found in the form of the nutlets.

As is usually the case with species confined to crevices of vertical rock, the population of *S. euadenia*, found only in one sheltered ravine wooded with *Abies cilicica*, is a relatively uniform one. The plant is strongly aromatic, smelling like *Melissa officinalis* L., and is extremely brittle.

Stachys lavandulifolia Vahl., Symb. Bot. **1**, 42 (1790).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Da., near summit, 2350 m., fl. purple, 10 Jul. 1949, *15081* ; distr. Gebiz (Pisidia) : Bozburun Da., N. side, 25 Jul. 1949, *15669*.

Stachys pinetorum Boiss. et Bal. in Boiss., Diagn. Ser. 2 (4) 36 (1859).

Prov. Adana, distr. Bahçe (Amanus) : Haruniye, in hedge, 26 Aug. 1949, *16373* (*forma dentibus calycis vix glandulosis*) ; Dildil Da., between Başkonuş Y. and Huseyin Oluk Çe., 1800 m., steep gully in *Abies cilicica* and *Ostrya carpinifolia* forest, in shade, 27 Aug. 1949, *16378*.

The species was collected on the same mountain by Haradjian (2317 & 3569). The Subsect. *Germanicae* Boiss. needs revision in the Orient.

Stachys pubescens Ten., Prodr. Fl. Nap. 34 (1811).

Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp Da., 1500 m., fl. white, 28 Jul. 1949, *15808*.

Stachys sericantha P. H. Davis, sp. nov. (Subsect. *Germanicae* Boiss.).

Species distinctissima, verisimiliter affinis *S. heracleae* All. et *S. balansae* Boiss. et Heldr. ; a priori caulibus gracilioribus, verticillastris omnibus remotissimis 2–6-floris laxis, foliis floralibus quam verticillastris 2–4-plo longioribus anguste oblongo-ovatis serratis spinuloso-mucronatis haud sessilibus, bracteis lanceolato-linearibus spinuloso-acuminatis, floribus duplo minoribus, calyce crassinervoso minus villosa sed magis glandulifero ad medium sub-bilabiato tubo aliquantum infundibulare, corolla alba (purpureo-maculata) valde recedit ; ab altera indumento sparsiore,

caulibus virgatis, foliis basi truncatis, verticillastris remotissimis paucifloris laxis, foliis floralibus longioribus omnibus serratis spinuloso-acuminatis, floribus sub-duplo minoribus, calycis forma et indumento, corollae colore longe distat.

Perennis, basi indurata. *Caules* floriferi erecti, simplices vel breviter ramosi, 35–70 cm. alti, valde quadrangulares, 1–2 mm. lati, paucifoliati, pilis longis eglandulosis et brevibus glandulosis hirsuti. *Folia* petiolata; subradicalium lamina anguste ovato-oblonga, 4–5 cm. longa, 14–17 mm. lata, basi truncata, serrato-crenata (crena terminale lateralibus aliquantum majore), apice subacuta, petiolo laxo villosa 1–2-plo longior, pilis paucis brevibus glandulosis et pilis numerosis longis eglandulosis et papillis glandulosis hirsuta, virescens; floralia brevissime petiolata, anguste ovata, serrata, spinuloso-mucronata, ea inferiorum verticillastris 3–4-plo longiora, superiorum verticillastris subduplo longiora. *Verticillastrea* 2–10-nata, remotissima, 2–6-flora, inferiora inter se 3–12 cm. distantia, in spicam valde interruptam 10–45 cm. longam disposita. *Bractae* lanceolato-lineares, spinuloso-acuminatae, 1–1.5 mm. latae, calycibus paulo breviores. *Pedicelli* circ. 2 mm. longi, hirsuti. *Calyx* 9–10 mm. longus, extus pilis longis eglandulosis et papillis glandulosis appresse hirsutus, crassinervosus, ad medium aequaliter sub-bilabiatus; tubus infundibularis, fauce barbatus; labium superius fere ultra medium in dentes ovato-triangulares spinoso-acuminatos trifidum; labium inferius ad basin in dentes ovato-lanceolatos spinoso-acuminatos bifidum. *Corolla* 13–16 mm. longa, alba, ad medium \pm aequaliter bilabiata; labium superius ovatum, integrum, superne sensim sed breviter attenuatum, obtusum, supra dense sericeum; labium inferius trilobatum, purpureo-maculatum, lobo mediano orbiculare integro lateralibus ovato-oblongis obtusis subtus dense sericeis duplo longiore. *Stamina* 3–5 mm. longa. *Nux* ovata, 2 mm. longa, 1.5 mm. lata, haud triquetra, obtusa sed apice ipso subapiculata, fusca, laevis.—Floret Jun.–Jul.

Prov. Antalya, distr. Kemer (Lycia): between Ovacik on Teke Da. and Söğüt Cumasi Y. near Çalbalı Da., 1100–1300 m., 13 Jul. 1949, *Davis 15227* (*typus in Herb. Kew.*); Teke Da. near Ovacik in *Pinetum brutiae*, 1200 m., fl. white with purple spotting, 12 Jul. 1949, *15163* & *15342*; Tahtali Da., between Kesme Boğ. and Kuzdere Y., in *Pinetum brutiae* wood, 8 Jul. 1949, *15156*.

The flowers of this very distinct woodlander are nearly as small as in the species that characterise the rather heterogeneous Subsect. *Micranthae*. Indeed, the bristle-tipped floral leaves and bracts give it a superficial resemblance to *S. setifera* C. A. Mey in that subsection—a plant, however, of very different habit and ecology. The facies of *S. sericantha* is so essentially that of certain species in Subsection *Germanicae* Boiss. that I have little hesitation, despite the plant's small flowers, in placing it there. In its morphology it seems more closely allied to *S. heraclea* All. than to *S. balansae* Boiss. et Heldr.; but the former is confined to the West and Central Mediterranean, whereas the latter is endemic to the northerly parts of Anatolia, so that in the diagnosis I have allied it to both these species in Subsect. *Germanicae*. It forms a potentially fertile hybrid (*S.* \times *burrii* P. H. Davis, *vide supra*) with *S. cretica* L. subsp. *mersinaeae* Rech. fil. in the same Subsection. In its rather small, few-flowered whorls the new species bears some resemblance to *S. sylvatica* L. (in

Subsect. *Sylvaticae* Boiss.), but is sharply marked off by its different habit and well-developed bracts, and by the form of its calyx and floral-leaves.

S. sericantha is a common plant in the dry *Pinus brutia* forest (a community with a very limited herbaceous flora) to the West of the Bay of Antalya.

Teucrium cavernarum P. H. Davis, sp. nov. (Sect. *Isotriodon* Boiss.).

Affinis *T. odontites* Boiss. et Bal. ; sed indumento dense velutino canescente, foliis subintegris removitur. A *T. heliotropifolio* Barbey indumento brevior, ramis tenuissimis brevioribus vix tortuosis foliis minus obtusis differt.

Planta perennis, caespitosa, saxatilis. *Indumentum* caulium et foliorum et pedicellorum et bractearum et calycum e pilis eglandulosis numerosissimis et glandulis brevissime stipitatis paucis compositum. *Caules* e basi indurato numerosi, simplices (vetustiores basi longe persistentes conferti) flexuoso-decumbentes vel in umbra arcuato-ascendentes, 3–15 cm. longi, tenuissimi, minus 1 mm. lati, subteretes, velutini, canescentes. *Folia* subintegra, ovato-orbicularia, basi truncata, subobtusata, brevissime petiolata, 5–10 mm. longa, 4–9 mm. lata, internodiis \pm aequa, dense velutina, cinerea, nervis lateralibus utrinque 3–4, subtus paulo prominentibus. *Racemus* \pm laxis, 2–4 (5) cm. longus. *Flores* semper bini oppositi, inferiores 4–8 mm. distantes. *Bractaeae* ellipticae, pedicellos 1.5–3 mm. longos \pm aequantes. *Calyx* 5 mm. longus, dense velutino-hirsutus, canescens, basi subsaccatus, ad $\frac{1}{3}$ – $\frac{2}{5}$ bilabiatus; labium superius fere ultra medium in dentes late triangulari-ovatos obtusiusculos trifidum, dente mediano laterales aequante vel submajore ; labium inferius superiore sublongius, ad basin in dentes triangulari-lanceolatos acutos bifidum. *Corolla* purpurea, 8–9.5 mm. longa, extus dense pubescens ; labium 5-lobatum, lobis lateralibus posterioribus 3 mm. longis lanceolatis subacuminatis ciliatulis, lateralibus anterioribus anguste ovatis vix 2 mm. longis, mediano orbiculare 3–4 mm. lato integro concavo. *Stamina* 4–5 mm. longa. *Nuculae* late ovato-oblongae, basi truncatae, apice obtusissimae, 1.25 mm. longae, 0.75 mm. latae, laeves, pallide brunneae.—Floret Jul.–Aug.

Prov. Konya, distr. Ermenek (Isauria) : Ermenek, at Meydan Çe., 1300–1400 m., in rock-crevices, often with *Trachelium myrtifolium*, fl. purple, 13 Aug. 1949, Davis 16137 (*typus in Herb. Kew.*) ; Kaniş D. between Ermenek and Oyuklu Da., 1400–1500 m., on vertical rocks and in the mouths of caverns, fl. purple, 14 Aug. 1949, 16181.

In its more or less entire leaves and velutinous indumentum this attractive new species recalls *T. heliotropifolium* endemic to Karpathos in the Dodecanese. Nevertheless, it certainly seems to be most closely related to the Cilician *T. odontites*, which has the same habit but possesses serrate-crenate leaves and a different indumentum ; the occurrence of an occasional small tooth on the leaves of *T. cavernarum* enhances the likelihood of this affinity. In addition to the characters given in the diagnosis, it appears to differ further from *T. odontites* in having a raceme that is normally less lax than in that species.

T. cavernarum is frequently a constituent of the specialised community virtually confined to the mouths of limestone caverns in the Ermenek

area, being often found with *Erodium pelargoniflorum* Boiss. et Heldr. and *Campanula leucosiphon* Boiss. et Heldr.

The Sect. *Isotriodon* Boiss. consists of essentially saxatile species, all of very limited distribution and poorly represented in herbaria. Lack of sufficient material makes some of them hard to delimit, but a key is given below to all the species at present known in this section which extends from Baluchistan to the Ionian Islands. *T. persicum* Boiss. holds an anomalous position in an otherwise natural group, and undoubtedly shows affinities with *T. stocksianum* Boiss. in Sect. *Polium* (Mönch) Benth. In view of the occurrence of species on the islands of Karpathos and Cythera, the absence of a Cretan representative is noteworthy.

Key to species of Teucrium Sect. Isotriodon Boiss.

Plant an erect twiggy shrublet ; leaves broadest above the middle ; calyx teeth all acute (S. Persia ; Baluchistan). . . *T. persicum* Boiss.

Plant woody only at the base, \pm decumbent ; leaves broadest below the middle ; upper calyx-teeth obtuse :

Leaves palmatifid (Kurdistan) *T. palmatum* Náb. (*non vidi*).

Leaves serrate-crenate or entire :

Raceme lax, elongated :

Lamina \pm entire :

Stems 0.75–1 mm. broad, long and tortuous ; leaves very obtuse, velutinous (Dodecanese) . . . *T. heliotropifolium* Barbey.

Stems 0.3–0.75 mm. broad, scarcely tortuous ; leaves \pm obtuse, very shortly velutinous (Isauria)
T. cavernarum Davis.

Lamina serrate-crenate :

Stems pilose, flexuous ; leaves subacutely serrate-crenate, shortly scabridulous-pilose (Cilicia)
T. odontites Boiss. et Bal.

Stems shortly villosulous, tortuous ; leaves very obtusely serrate-crenate, \pm velutinous or shortly villosulous
T. montbretii Benth.

subsp. *pamphylica* Davis (Pamphylia ; Lycia), subsp. *libanotica* Davis (Lebanon) & subsp. *judaica* Davis (Palestine).

Raceme \pm dense, abbreviated :

Leaves petioled, ovate or orbicular-ovate, at least the lower obtuse :

Lamina persistently hairy, \pm canescent, broadly ovate, length $1\frac{1}{4}$ – $1\frac{1}{2}$ times width :

Leaf-indumentum velutinous (W. Asia) :

Stems 0.75–1.0 mm. broad, tortuous ; laminae 9–13 (22) mm. long, all obtuse, obtusely 5–6-serrate-crenate ; bracts usually shorter than the calyces (Cassius ; Amanus ; Cilicia)

T. montbretii Benth. subsp. *montbretii*

Stems 1–1.25 mm. broad, subflexuous ; laminae 17–22 mm. long, the upper acute, subacutely 7–8-serrate-crenate ; bracts longer than the calyces (Jebel Seman) . . .

T. haradjiani Briq. ex Rech. fil.

Leaf-indumentum lanate-villous (S.E. Europe) :

Lamina abruptly truncate at base ; corolla 7–9 mm.

- long (Aetolia ; Corcyra) . . . *T. halacsyanum* Heldr.
Lamina broadly cuneate at base ; corolla 12–14 mm.
 long (Cythera)—*T. francisci-wernerii* Rech. fil. (*non vidi*).
Lamina glabrescent when mature, ovate, twice as long as broad
 (N. Syria : Nusairy Mts.)
T. heterotrichum Briq. ex Rech. fil.
Leaves sessile, ovate-lanceolate, all acute (S. Turkey : Aintab)
T. paederotoides Boiss. et Hausskn. ex Boiss.

Teucrium chamaedrys L., Sp. Pl. 563 (1753) subsp. **chamaedrys** var. **lydium** (Schwarz) Davis, stat. nov. (*T. chamaedrys* L. subsp. *lydium* O. Schwarz in Fedde, Repert. **36**, 132 : 1934.)

Prov. Antalya, distr. Kemer (Lycia) : Teke Da. near Ovacik, 1100–1200 m., 12 Jul. 1949, 15172.

The difficulty of delimiting subsp. *lydium* O. Schwarz from subsp. *chamaedrys* (subsp. *eu-chamaedrys* Rech. fil. ; subsp. *illyricum* (Borb. et Bornm.) Degen) makes it convenient to treat the former as a variety of the typical subspecies, especially as it simplifies the classification of those Turkish populations that are intermediate between subsp. *chamaedrys* and other subspecies occurring in Anatolia.

subsp. **tauricum** Rech. fil. in Bot. Archiv. **42**, 376 (1941).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., above Atlik Y., 2000 m., 27 Aug. 1949, 16418.

f. inter subsp. **sypshirensis** (Čel.) Rech. fil. et subsp. **tauricum** Rech. fil.

Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Çamurlu Y. and Olucak, 2000 m., 18 Aug. 1949, 16311.—These two subspecies are connected by many intermediates in Southern Anatolia.

f. inter subsp. **tauricum** Rech. fil. et subsp. **chamaedrys**.

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., at Tozlu Çukur Y., 1900 m., 24 Jul. 1949, 15585 ; Bozburun Da., near Taşlı Y., 1700 m., 26 Jul. 1949, 15603.

Teucrium creticum L., Sp. Pl. 563 (1753).

Prov. Mersin, distr. Anamur (Cilicia Trachea) : above Gilindere, 300 m., in maquis, 20 Aug. 1949, 16335.

Teucrium kotschyianum Poech., Enum. Pl. Ins. Cypr. 24 (1842).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Daribükü and Selköşe, in metamorphic valley, 30 Jul. 1949, 15861.

As in Cyprus, the species was growing on non-calcareous rock.

Teucrium lamiifolium Urv. in Mem. Soc. Linn. Paris, **1**, 320 (1822).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Oruz Gaz Y. and Selköşe, 1200–1400 m., metamorphic soils, 1 Aug. 1949, 15907 (*forma foliis parvis, bracteis quam calycibus sub-brevioribus, dente medio labii superioris calycini acuto a typo differt*).

The gathering matches an Isaurian specimen from near Geyik Dağ (Davis 14719), except that in the latter the median tooth of the upper calyx-lip is obtuse, though apiculate. I have seen no other material of

this species from the Taurus, where it is evidently scarce. Taurus gatherings, when more are available, may require varietal or subspecific rank.

Teucrium montanum L. var. **parnassicum** Čel. in Bot. Centr. **14**, 153 (1883).

Prov. Isparta, distr. Sütçüler (Pisidia) : Sarp Da., 1900 m., 29 Jul. 1949, 15953 ; *ibid.*, 1700 m., rocky slopes, corolla yellowish, 29 Jul. 1949, 15786. Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Beşkuyu and Çamurlu Y. (between Ermenek and Anamur), 17 Aug. 1949, 16288.

Teucrium montbretii Benth. in Ann. Sc. Nat. Bot. Ser. 2, **6**, 56 (1836) subsp. **montbretii**.

Indumentum caulium et foliorum velutinum fere eglandulosum haud viscosum. *Lamina* foliorum 1.0–1.5 cm. longa, ovata, obtusa, basi abrupte truncata, utrimque 5–6-crenata, nervatura indistincta ; petiolus 2.5–5.0 mm. longus. *Flores* brevipedicellati, in racemum densum ovato-oblongum 1.5–3.5 cm. longum (in umbra attenuatum) coarctati. *Bractae* lanceolatae, inferne attenuatae, calycibus breviores vel sub-longiores, hirsuto-villosulae, fere eglandulosae. *Calyx* 3–5 cm. longus, pilis longis eglandulosis et pilis brevibus glandulosis hirsuto-villosulus.

Typus : in rupibus ad pedes Montis Casii in Syria septentrionali, 1836, *Montbret* !

subsp. **pamphylicum** P. H. Davis, subsp. nov.

A subspecie *montbretii* indumento caulium et foliorum paulo longiore subviscidulo e pilis brevibus glanduliferis et pilis longis eglanduliferis numerosioribus composito, foliis utrimque 6–8-crenatis, nervatura subdistinctiore, racemo laxo attenuato-cylindrico 3–10 cm. longo floribus inferioribus inter se 5–10 mm. distantibus, bracteis pedicellis aequantibus vel brevioribus lanceolato-ellipticis recedit.—A subsp. *libanotico* P. H. Davis indumento (praesertim foliorum et calycum) longiore breviter villosulo canescente minus viscoso, foliis utrimque 6–8-crenatis, petiolis paulo longioribus 2.5–4 mm. longis, bracteis brevioribus et pro proportionem latioribus, lobo mediano labii calycini superioris lobis lateralibus manifeste latiore differt.

Prov. Antalya (Pamphylia) : Konya Alti near Antalya, 10 m., 17 May, 1936, *T. A. Tengwall* 604 ; Antalya, W. of harbour, scarce, stems appressed to rocks, very brittle, fl. lilac, 19 Aug. 1947, *Davis* 14217 (*typus* in *Herb. Kew.*) ; distr. Kemer (Lycia), Gönük, 50 m., crevices of limestone rocks, 7 Jul. 1949, *Davis*, 15019.

T. montbretii subsp. *pamphylicum*, despite its long lax raceme, seems to be most closely related to the typical form of the species from Cassius, Amanus and the Cilician Taurus than to *T. odontites* from coastal Cilicia ; the latter, which has a lax raceme, differs from the Pamphylian plant in its rather more slender, scarcely intricate stems, smaller, sharper and fewer leaf-dentations, and different indumentum. Other gatherings of Sect. *Isotriodon* have been made by the writer in Palestine and Lebanon, and these are described below as subsp. *judaicum* and subsp. *libanoticum* of *T. montbretii*. Like subsp. *pamphylicum*, they differ from the typical form of the species in their lax elongated racemes, although that of

subsp. *judaicum* is shorter and less loose than that of the others. Further material may show that these lax-racemed forms can be included under one species distinct from *T. montbretii*; for this reason a full description is given of the Lebanon plant, of which the best material is available. However, some specimens of subsp. *montbretii*—evidently shade forms—have rather loose and elongated inflorescences, and I prefer at present to place the other plants within this species which (in its narrow sense) they otherwise so closely resemble in habit and leaf-shape. Thus interpreted, the species has a markedly disjunct distribution. A key to the species of Sect. *Isotriodon* is given under *T. cavernarum* P. H. Davis above.

In all forms of *T. montbretii*, *sensu lato*, short glandular hairs occur among the long eglandular ones on stems, leaves, pedicels, bracts and calyces. In subsp. *montbretii*, however, they are exceedingly few on the stems, leaves and bracts, so that these parts are not viscous. In the other subspecies glandular hairs are numerous, and the plants are therefore slightly sticky; the viscosity is most highly developed in subsp. *libanotica*, particularly on the inflorescence which readily becomes covered with particles of grit.

subsp. **libanoticum** P. H. Davis, subsp. nov.

A subsp. *montbretii* indumento \pm viscoso e pilis brevibus glanduliferis (pilis longis eglanduliferis commixtis) numerosioribus composito, foliis brevius petiolatis, supra \pm viridibus, nervatura supra impressiore subtus prominentiore, floribus inferioribus inter se 4–8 mm. distantibus in racemum laxum attenuato-cylindricum dispositis divergit.

Planta basi intricato-suffruticulosa, saxatilis. *Indumentum* e pilis brevibus glanduliferis (praesertim numerosis in axe inflorescentiae et in pedicellis et calycibus) et pilis longis eglanduliferis compositum. *Caules* floriferi 7–15 (20) cm. longi, rupibus appressi, dense et breviter visciduloso-villosuli. *Folia* brevipetiolata; lamina late triangulari-ovata, 8–13 mm. longa, prope basin 7–12 mm. lata, basi abrupte truncata vel etiam cordata, crenis obtusis utrimque 5–6 subregulariter munita, supra breviter visciduloso-pubescent, \pm viridis, subtus dense et breviter visciduloso-tomentosula, canescens, nervatura supra impressa, subtus prominente; petiolus 1–2 (3) mm. longus. *Racemus* laxus, subsecundus, attenuato-cylindricus, 3–10 cm. longus, \pm 1 cm. latus, floribus inferioribus inter se 4–8 mm. distantibus. *Bractae* plerumque 3 (3.5) mm. longae, lineari-lanceolatae, viscoso-hirsutae ut pedicelli 2 (3) mm. longi et axis inflorescentiae. *Calyx* 4 mm. longus, primo patens, deinde nutans, viscoso-hirsutus, aequaliter bilabiatus; dentes inferiores duo 1.5 mm. longi, late lanceolati acuti apiculati, superiores tres late ovati obtusi breviter apiculati, medianus 1 mm. longus lateralibus vix latior. *Corolla* 7.5 mm. longa, sordide purpurea, subtus breviter pubescens; labium 5-lobatum, lobo mediano orbiculare concavo 2.5 mm. lato, lobis lateralibus anterioribus oblongis undulatis 1.75 mm. longis, posterioribus lanceolatis 2.5 mm. longis dense ciliatis. *Nux* late oblonga, 1.25 mm. longa, 0.75 mm. lata, obtusissima, laevis, pallide brunnea.—Floret Jun.

LEBANON: Sîr, 800–1000 m., on limestone rocks with *Galium canum* and *Stachys palaestina*, leaves green, fl. dusky purple, 17 June 1942, Davis 6399 (*typus* in *Herb. Kew.*).

subsp. **judaicum** P. H. Davis, subsp. nov.

A subspecies *montbretii* indumento caulium et foliorum longiore sed breviter villosa \pm viscidula, foliis utrimque 6–8-crenatis nervatura distinctiore, floribus inferioribus 4–5 mm. distantibus racemum sublaenum 3–5 (8) cm. longum formantibus, bracteis paulo brevioribus distinguitur. —A subsp. *libanotico* P. H. Davis indumento praesertim foliorum et caulium longiore minus viscoso, foliis longius petiolatis (petiolis 2.5–4 (5) mm. longis) canescentibus crenis utrimque 6–8, racemo brevior minus laxo differt.

PALESTINE (Judea) : Wadi Suwenit below Michmas, in crevices of overhanging cavernous cliffs in complete shade, fl. mauvish pink, twice as long as calyx, 12 Dec. 1942, *Davis 5036* (*typus in Herb. Kew.*).

The gathering is mainly in fruit. The leaves are usually thinner than those of the other subspecies, but this may well be due to the shady environment. The plant often grew upside down in the rocks at the mouths of shallow caverns, and certainly had the appearance of a relict population surviving in a specialised habitat. *Stachys palaestina* L. and *Galium canum* Req. ex DC., which accompany subsp. *libanoticum*, grow also with subsp. *judaica*, the *Galium* in Judea being apparently confined to mouths of caverns.

Teucrium orientale L., Sp. Pl. 562 (1753).

Prov. Konya, distr. Ermenek (Isauria) : Ermenek, 1300 m., 13 Aug. 1949, *16157* (*forma indumento lanato-villoso*). Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Selköşe and Oruz Gaz Y., on metamorphic slopes, fl. lavender-blue, 1200–1400 m., 1 Aug. 1949, *15921*.

Teucrium polium L., Sp. Pl. 566 (1753), *sensu lato*.

Prov. Antalya, distr. Kemer (Lycia) : between Ovacik on Teke Da. and Söğüt Cumasi Y. near Çalbalı Da., fl. white, 13 Jul. 1949, *15234* ; Gönük, 0–50 m., erect, 7 Jul. 1949, *15040* ; distr. Gebiz (Pisidia), Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 1500 m., decumbent, fl. white, 24 Jul. 1949, *15562*. Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ. between Sarivadi and Beşkuyu, fl. white, 16 Aug. 1949, *16230*. Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., above Atlik Y., 2000 m., 27 Aug. 1949, *16431*.

Teucrium scordioides Schreb., Pl. Vert. Unilab. 37 (1774).

Prov. Antalya, distr. Kemer (Lycia) : Tahtalı Da. at Kuzdere, 900 m., 8 Jul. 1949, *15153*.

Thymbra spicata L., Sp. Pl. 569 (1753).

Prov. Antalya, distr. Kemer (Lycia) : Gönük, fl. purple, 7 Jul. 1949, *15032*.

Thymus chaubardii (Boiss. et Heldr.) Čel., in Flora, 1883 : 172.

Prov. Antalya (Lycia) : between Tepe Delen Y. and Söğüt Cumasi Y. near Çalbalı Da., in Cedar forest, fl. pale lilac, 13 Jul. 1949, *15261* ; between Kar Çukuru and Fesliken Y. near Çalbalı Da., 1800 m., 14 Jul. 1949, *15400* ; distr. Gebiz (Pisidia), Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 1500 m., under *Pinus nigra* subsp. *pallasiana*, fl. white, 24 Jul. 1949, *15574a*, and Bozburun Da. between Taşlı Y. and Kozlu D., 1600 m., fl. white—pale lilac, 27 Jul. 1949, *15764*. Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., above Oruz Gaz Y., 2100 m., 2 Aug. 1949, *16005* (high mountain form).—Det. Ronn.

Thymus cilicicus Boiss. et Bal. in Boiss., Diagn. Ser. 2 (4) 8 (1859).

Prov. Antalya, distr. Gebiz (Pisidia) : between Boğaz Ağzi and Tozlu Çukur Y. on Bozburun Da., 1500 m., fl. lilac, 24 Jul. 1949, 15557. Prov. Konya, distr. Ermenek (Isauria) : Ermenek, 1300-1400 m., fl. lilac, 13 Aug. 1949, 16138. Prov. Mersin, distr. Anamur (Cilicia Trachea) : between Çamurlu Y. and Olucak Y. (between Ermenek and Anamur), fl. violet, 18 Aug. 1949, 16313.—Det. Ronn.

Thymus hirsutus M.B. var. **cherlerioides** (Vis.) Ronn. in Rech. fil., Fl. Aegaea, 541 (1943).

Prov. Mersin, distr. Anamur (Cilicia Trachea) : Çamurlu Y. between Ermenek and Anamur, 2100 m., 16319.—Det. Ronn.

var. **ciliato-pubescens** (Hal.) Ronn. in Hayek Prodr. Fl. Pen. Balc. 2, 367 (1930).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da. above Oruz Gaz Y., 2200-2400 m., screes, fl. lilac, 2 Aug. 1949, 15961 (also found up to 2800 m.). Prov. Adana, distr. Karaisah (Cilicia) : Bulgar Da., near Sari Tepe Y. (above Alihoca), 2 Sept. 1949, 16565.—Det. Ronn.

Thymus kotschyanus Boiss. et Hohen. var. **hohenackeri** Ronn. in Fedde, Repert. 31, 139 (1933).

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., above Başkonuş Y., 1700-1800 m., 27 Aug. 1949, 16423.—Det. Ronn.

Thymus leucotrichus Hal., Consp. Fl. Graec. 2, 561 (1902).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da. near Kuruca Ova Y., 2200 m., fl. mauve, 25 Jul. 1949, 15686 ; Bozburun Da., N. side, 2200-2300 m., fl. mauve, 25 Jul. 1949, 15639.—Det. Ronn.

Thymus ocheus Heldr. et Sart. in Boiss., Diagn. Ser. 2 (4) 6 (1859).

Prov. Antalya (Lycia) : Çalbalı Da., 2000 m., 14 Jul. 1949, 15407.—Det. Ronn.

Thymus revolutus Čel. in Flora, 1883 : 171.

Prov. Antalya, distr. Kemer (Lycia) : Gönük, 0-50 m., gravelly ground in very open *Pinetum brutiae*, fl. purple, 7 Jul. 1949, 15033 ; distr. Gebiz (Pisidia), near Gebiz, with *Phlomis nissolii*, 50 m., 21 Jul. 1949, 15465.—Det. Ronn.

Thymus sipyleus Boiss., Diagn. Ser. 1 (5) 16 (1844) var. **sipyleus**.

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Taşlı Y. and Kozlu D. 1600 m., fl. white, 27 Jul. 1949, 15738.—Det. Ronn.

var. **imbricatus** (Čel.) Ronn. in Rech. fil., Fl. Aegaea, 540 (1943).

Prov. Antalya (Lycia) : Çalbalı Da., between Kar Çukuru and Fesliken Y., 1800 m., 14 Jul. 1949, 15401 ; distr. Gebiz (Pisidia), Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., 1700 m., 24 Jul. 1949, 15579.—Det. Ronn.

var. **punctatus** Ronn. apud Davis in Kew Bull. 1949 : 425 (1949). (*T. punctatus* Vis. in Mem. Ist. Venet. 1, 1842 : 43 (1843), non Willd. : 1794.)

Prov. Adana, distr. Bahçe (Amanus) : Dildil Da., between Başkonuş

Y. and Hussein Oluk Çe., 1800 m., rocky slopes and rocks, fl. pale lilac, 27 Aug. 1949, 16402.—Det. Ronn.

Thymus squarrosus Fisch. et Mey. in Ann. Sc. Nat. Bot. Ser. 4, **1**, 32 (1854).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Boğaz Ağzi and Tozlu Çukur Y., under Black Pines with *Thymus chaubardii*, 24 Jul. 1949, 15574b.—Det. Ronn.

var. **phrygius** Ronn., var. nov.

Folia utrinque intense hirsuta ; *rami* floriferi pilis laxe retrorsis paulo patulis obsiti.

Prov. Antalya (Lycia) : Çalbalı Da., near Tepe Delen Y., 1800–1900 m., 14 Jul. 1949, 15300. As. Minor, in stepposis inter Uşak et Sivas, circ. 1200 m., May 1939, V. Skrivaneek. As. Minor, Berg. Gelendas (Egardia sjon), 3 June 1935, Erik Wall.—Det. Ronn.

Thymus zygoideus Gris. var. **lycaonicus** Ronn. in Hayek., Prodr. Fl. Pen. Balc. **2**, 365 (1930).

Prov. Antalya (Lycia) : between Tepe Delen Y. and Söğüt Cumasi Y. near Çalbalı Da., 13 Jul. 1949, 15265.—Det. Ronn.

Ziziphora capitata L., Sp. Pl. 21 (1753).

Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da., between Selköşe and Oruz Gaz Y., on metamorphic soils, 1 Aug. 1949, 15917.

Ziziphora clinopodioides Boiss. var. **canescens** Benth., Lab. 321 (1833).

Prov. Antalya, distr. Gebiz (Pisidia) : Bozburun Da., between Taşlı Y. and Kozlu D., fl. mauve, 29 Jul. 1949, 15716. Prov. Isparta, distr. Sütçüler (Pisidia) : Dedegöl Da. above Dedegöl tarn, 2500 m., prostrate, fl. lilac, 1 Aug. 1949, 16003. Prov. Konya, distr. Ermenek (Cilicia Trachea) : Hamitseydi Boğ. between Sarivadi and Beşkuyu, fl. lilac-white, 16 Aug. 1949, 16233.

Ziziphora tenuior L., Sp. Pl. 21 (1753).

Prov. Ankara (Galatia) : Hacıkadun valley near Kecioren, by stream (with *Z. capitata* L.), 9 Jul. 1947, 13175 *pro parte*. Prov. Isparta, distr. Sütçüler (Pisidia) : Çimen Ov. on W. side of Sarp Da., 28 Jul. 1949, 15796 (*forma spicis abbreviatis, foliis floralibus falcatis*).

The holotype of *Z. tenuior* in the Linnean Herbarium has broader floral leaves and much more acute calyx-segments than in the common form of this species. My Pisidian gathering (15796) resembles the type in its broad (though distinctly falcate) floral leaves and very acute calyx-teeth, but differs in its abbreviated spike only 2–4 cm. long. It is intermediate between the type of *Z. tenuior* and *Z. capitata* L., approaching the latter in its falcate (though narrower) floral leaves and abbreviated (though still spicate) inflorescence ; but it differs in having the appendiculate fertile stamens typical of *Z. tenuior*. No. 15796 closely resembles the type-gathering of *Z. persica* Bunge var. *intermedia* Popov (Herb. Flor. Asiae Mediae editum Fasc. 9, Febr. 1926). Popov does not subscribe to Boissier's view that *Z. persica* is synonymous with *Z. tenuior*, but maintains that it differs specifically from the latter in having unappendaged stamens

(resembling those of *C. capitata*) and a subcapitate inflorescence ; indeed, Popov suggests that *C. persicum* may be a ' hybrid ' between *C. tenuior* and *C. capitata* " se multipliant et se progeant maintenant par soi-même ". However, a specimen collected by Bornmüller (8038) at Kazvin in Persia and determined by him as *C. persica*, has a capitate inflorescence and appendiculate stamens. I doubt if a line should be drawn between *C. tenuior* and *C. persica* at the species level : there are too many intermediates. As Popov has pointed out, *C. persica* var. *intermedia* Popov is intermediate between *C. persica* (*sensu orig.*) and *C. tenuior*, having an abbreviated spike and rudimentary staminal appendage.

THREE NEW SECTIONS OF CAREX.

E. NELMES.

In preparing a revision of the Carices of Malaysia, I have found it necessary to propose three new sections, which are described below.

SUBGENUS INDOCAREX.

Sect. **Hypolytroides** *Nelmes*, sect. nov.—*Culmi* interdum altissimi, nodosi. *Folia* per totam longitudinem culmi edita, subtus parce pubescentia. *Spicae* unisexuales, eae panicularum inferiorum omnino vel fere omnino femineae (plerumque 2 masculae), eae paniculae supremae interdum omnino masculae. *Utriculi* parvi, demum patentes, rubidi, abrupte rostrati, rostro parvo.—Species 2 : *C. hypolytroides* Ridley (typus), Sumatra ; *C. moupinensis* Franch., China.

SUBGENUS CAREX.

Sect. **Borneënses** *Nelmes*, sect. nov.—*Culmi* basi vaginis aphyllis spadiceis circumdati. *Spicae* androgynaeceae, 1–5.5 cm. longae, singulae vel binae, inferiores longipedunculatae. *Bractaeae* vaginantes ; *vaginae* spadiceae. *Glumae femineae* basi incurvae vel amplexicaules, oblongo-ovatae, apice plerumque obtusae, interdum oblongo-lanceolatae et acuminatae, brunneae, marginibus late albo-hyalinae. *Utriculi* anguste ellipsoidei, trigoni, multinerves, plerumque subadpresso-hispiludi, virides, demum brunnei, rostro bilobo, ore obliquo.—Species 4 : *C. pseudorivulorum* Kükenth., Malay Peninsula ; *C. kinabaluensis* Stapf, Borneo ; *C. borneënsis* C. B. Clarke (typus), Borneo ; *C. eymae* Nelmes, Celebes.

Sect. **Scleriiculmes** *Nelmes*, sect. nov.—*Culmi* aurei, vaginis foliorum fere omnino obtecti. *Folia* normalia tantum in parte superiore culmi gesta, superne in bracteis foliaceas inferne in vaginas aphyllas purpurascens vel vinaceas transeuntia, ligulifera. *Spica* terminalis mascula, laterales femineae vel androgynaeceae. *Bracteae* foliaceae, saltem inferiores inflorescentiam longe superantes, longivaginantes. *Glumae femineae* parvae, pallidae, lineolis parvis rubidis glandulosis maculatae. *Utriculi* parvi, ellipsoidei vel ellipsoideo-obovoidei, enerves, dense albido-setulosi, virides, rubido-glanduloso-maculati.—Species 3 : *C. ligulata* Nees, India, China, Japan ; *C. maubertiana* Boott (typus), India, China, Indo-China, Malaysia ; *C. hebecarpa* C. A. Mey., India.

The Discovery of Photosynthesis*—In 1779 John Ingen-Housz published, in London, a treatise entitled "Experiments upon Vegetables". A modified French edition of the same work appeared in 1787. Both editions are probably quite, or almost, unknown to present day students of botany. The modern student of plant physiology is introduced to the basic facts of photosynthesis very early in his career, after which he is likely to be told something about the latest researches in the subject. But how many, it may be wondered, will pause, even for a moment, to think of the history of the discovery of this fundamental process, or to realise the economic and social atmosphere that prevailed at the time when the pioneer researches on the subject were undertaken. In these days when many are privileged to work in enormous laboratories with every modern convenience, it is a very sobering experience to realize with what simple equipment, and in what unpretentious accommodation, the really great botanists of the past made what were, in their time, completely revolutionary discoveries of fundamental importance.

Students of the history of botany, and in particular of plant physiology, should be greatly indebted to Professor Howard S. Reed of the University of California for making more generally accessible the historically important book by Ingenhousz in which much of his work on vegetable physiology is described. The booklet under review consists chiefly of a new printing of the English edition of Ingenhousz' treatise, to which have been added a few excerpts from the later edition in French. The author has added many of his own comments "in the hope that they may guide those readers who wish to trace the influence of Ingenhousz' work on various developments in modern research". There is also a biographical sketch of Ingenhousz in which we are reminded that he was born in Breda, that he practised medicine in London acquiring so great a reputation by his success in treating smallpox by inoculation that he later became attached to the Austrian Court at the instigation of the Empress Maria Theresa. His truly scientific bent is revealed by the fact that in 1779 he extricated himself from his aristocratic environment, in which he commanded great respect, and returned to London in order to resume his studies on the relations between air and plants.

It is but seldom that a fundamental discovery is solely the product of one mind. In assessing the value of Ingenhousz' researches we are reminded that Hales' (1727) work was already available to him. He also enjoyed the friendship, and the resulting mental stimulus, of many notable scientific contemporaries. All this is clearly demonstrated in the book under review in a section entitled "Chemical Studies which led to the Discovery of Photosynthesis".

To the reviewer it appears rather disturbing to find that Professor Reed's comments have been inserted at intervals in the text immediately following the passages by Ingenhousz to which they refer. This no doubt facilitates reference to the original work, but the repeated sudden transitions from eighteenth century to modern English breaks the continuity of Ingenhousz' original text. This would have been avoided if Ingenhousz' text had been published as a continuous whole, followed by the comments thereon. This, however, is but a small blemish, and the book should be welcomed by all those botanists who wish to broaden their outlooks by viewing their respective specializations against an historical background.

C. R. METCALFE

*Reed, Howard S.—Jan Ingenhousz—Plant Physiologist. With a History of the Discovery of Photosynthesis. Waltham, Mass. : The Chronica Botanica Co. : London W.C.2 : Wm. Dawson & Sons Ltd. pp. 108. 1949. \$3.00.

THE GENUS RICOTIA.

B. L. BURTT.

Ricotia Linn. is a small genus of *Cruciferae* placed in the tribe *Lunarieae* in the classification proposed by O. E. Schulz (see Engler & Prantl, *Die natürliche Pflanzenfamilien*, 2 Aufl., 17 B : 279. 1936) ; it is found in the eastern Mediterranean region. Hitherto it has consisted of some four or five species of annual herbs, but Mr. P. H. Davis has recently discovered two interesting perennial species, described below as *R. davisiana* and *R. varians*, and the moment therefore seems opportune to offer a few remarks on the genus as a whole. In investigating its affinity with other genera it was found that *Peltaria* section *Aethionematopsis* N. Busch showed a greater community of characters with *Ricotia* than with *Peltaria* proper. At first, when only *R. davisiana* of the new species had been discovered, some hesitation was felt whether to raise this section to the rank of an independent genus or to incorporate it in *Ricotia* ; but since the finding of *R. varians* in 1949 its inclusion in *Ricotia* has become inevitable. The genus now consists of 9 species.

The type species of *Ricotia* is *R. lunaria* (L.) DC., which was first described by Linnaeus as *Cardamine lunaria*, but was placed by him in the new genus *Ricotia* in the second edition of *Species Plantarum* in 1762. In making this transfer Linnaeus adopted a new specific epithet, *aegyptiaca*, in place of *lunaria*. Fortunately, for this plant is not a native of Egypt but of Syria and Palestine, it is the earlier epithet that must be maintained.

The other species which have been generally accepted as rightful members of *Ricotia* were described by Boissier and Heldreich ; they are *R. cretica*, *R. sinuata* and *R. carnosula* ; from the last of these *R. pestalotiana* Cesati may not be distinct.

R. lunaria differs from this later group of species in its fruit-structure. In general appearance its pods somewhat resemble those of the genus *Lunaria* ; the seeds vary in number from 1 to 5, and, while the fruit is naturally longer when it contains the higher number, there is no obvious relation between the size of the seeds and the width of the fruit, which is always greatly in excess. In the mature fruit the septum exists only as a most fragile membrane and was thought to be entirely absent by some early workers : the seeds possess a well-marked granulated marginal area.

Of the other species mentioned above *R. cretica* has the greatest excess of fruit-width over seed-diameter, amounting to about 25 per cent. In *R. carnosula* the ripe seed almost fills the width of the pod, and in Boissier's description of *R. sinuata* the pod is described as being constricted between the seeds. In these species the seeds are more numerous (up to twelve), so that the pod is definitely linear in outline. The septum is persistent and the opening of the pod appears to take place by the complete falling away of the valves, which become free from the base upwards. The seeds in this group may have a somewhat granular marginal zone as in *R. lunaria* or a definite membranous wing.

If the differences in fruit-shape of these species be expressed in terms of the ratio length : breadth, we find that this may vary from $1\frac{1}{2} : 1$ to $3 : 1$ in *R. lunaria*, but is up to $7 : 1$ in *R. carnosula*. Similarly in the allied

genus *Farsetia* Turra the ratios in *F. aegyptia* Turra and *F. longisiliqua* Decne. are about 2 : 1 and 12 : 1 respectively. These figures serve to emphasise that amongst the very numerous variations of the *siliqua*, the characteristic cruciferous fruit, the terminological recognition of the *silicula*, as a type in which the length is only 2–3 times the breadth, is scarcely warranted. It has, of course, long been realised that Linnaeus's division of the genera of his class *Tetradynamia* into two series *Siliculosa* and *Siliquosa* is untenable. To term the fruit of *Ricotia carnosula* or *Farsetia angustisiliqua* a *siliqua* and distinguish that of *R. lunaria*, or *F. aegyptia*, as well as the very different fruit of, say, *Capsella*, as a *silicula* is equally unjustifiable; for the *Ricotia* and *Farsetia* fruits are all structurally similar, whereas that of *Capsella* is fundamentally different in the plane of compression. The *silicula*, as defined by proportions alone, is a category of static descriptive morphology which can play no useful role in modern botany.

Ricotia davisiana is a most interesting addition to the genus and necessitates emendation to the vegetative characters of the generic description by reason of its perennial habit, trifoliolate leaves and well-developed indumentum of short spreading hairs. As the other species mentioned above may be summarized as glabrous or subglabrous annual herbs with pinnatisect leaves, the differences were sufficient to demand that the inclusion of this new species in *Ricotia* be carefully justified. Point by point comparison of the flowers and fruits of *R. davisiana* and *R. cretica* showed complete agreement as to generic features, in fact specific recognition would be by no means easy in the absence of the vegetative parts.

Despite the distinctive fruit-characters of *R. lunaria*, all these species may be regarded as true members of the genus in its narrower sense. Historically the first of the anomalous species is *R. tenuifolia* Sibthorp & Sm. For our knowledge of this species we must rely on the beautiful illustration in the *Flora Graeca* of these authors, since the specimen in the Sibthorp herbarium at Oxford is totally devoid of flowers, fruits and even leaves, whilst that in the Banks herbarium (British Museum) is equally bare save for a single pendent pod. Boissier retained *R. tenuifolia* in *Ricotia* in the first volume of his *Flora Orientalis* (1867), but in the *Supplementum* (1888) he took up for it Sibthorp's manuscript name *Peltaria caramaniensis*. At the same time he recorded another additional species of *Peltaria*, *P. isatoides* Barbey, and his altered treatment of Sibthorp's plant almost certainly stems from the fact that Barbey cited it as a species related to his *P. isatoides*. Both these species, Boissier noted, were to be inserted next to *P. aucheri* Boiss., which he had himself described some 40 years earlier and had apparently referred to *Peltaria* quite independently of Sibthorp's ideas on *Ricotia tenuifolia*.

Boissier grouped these three species apart from the older elements of *Peltaria* and this treatment was carried a stage further by N. Busch, in *Flora caucasica critica*, who recognized two distinct sections, *Eupeltaria* and *Aethionematopsis*. The arrangement was ratified by O. E. Schulz in his account of *Cruciferae* for the second edition of *Die natürliche Pflanzenfamilien*, but, as already noted, I find it quite unsatisfactory and it must now be examined in detail.

The genus *Peltaria* was established by N. L. Jacquin (Enum. Stirp. Vindobon. 260. 1762) for the central European species *P. alliacea* Jacq.

and was accepted by Linnaeus (Sp. Pl. ed. 2, 910. 1763). Later additions have raised the number of species of Section *Eupeltaria* to four, and its range is extended through Asia Minor to Transcaspia (Turkmenistan). These species form a relatively homogeneous group: they are erect herbs with well-developed leaves and stems which branch towards the top and bear a corymb of numerous small white flowers. An important feature of these flowers is that the calyx consists of small non-coherent sepals which soon fall from the opening flower: none of these sepals is saccate at the base. The pods are indehiscent, more or less orbicular, flat, of a somewhat papery texture; they have a well-developed marginal vein and contain a single (rarely 2-3) centrally placed unwinged seed equalling about one half or one third of the pod in diameter.

In diagnosing the section *Aethionematopsis* ("caules ascendentes, ramosi vel subsimplices; petala rosea; silicula anguste alato-marginata") Busch failed to recognize that the calyx of this group does not conform to the generic character given by him, namely "calyx patens aequalis". Schulz later repeated the same error in his key to the genera of *Lunariae*, a key which leaves the species of *Peltaria* sect. *Aethionematopsis* hanging in mid-air near *Lunaria*, *Ricotia* and *Tchihatchewia*. These errors arise from the failure to observe that *P. aucheri* and *P. isatoides* (the lack of material of *P. caramanensis*=*Ricotia tenuifolia* has already been mentioned) have calyces in which the sepals are erect and cohere together (the calyx is "closed") and the lateral sepals are saccate at the base. Such characters, together with those mentioned by Busch, quite clearly take the section *Aethionematopsis* out of *Peltaria* and place it in the affinity of *Ricotia*. *Peltaria* and its immediate allies, all characterised by "open" calyx, non-saccate sepals and an utterly different facies, need not be further considered; the problem now concerns the relationship between the Section *Aethionematopsis* and *Ricotia*.

As this investigation was carried out in the first place, a point by point comparison between *Ricotia* and section *Aethionematopsis* was written out; but at that time *Ricotia varians*, discovered by P. H. Davis in 1949, was unknown. With the finding of this species the whole position has changed. Whereas the original investigation was designed to lead to a decision whether sect. *Aethionematopsis* should be included in *Ricotia* or established as an independent genus, a study of *Ricotia varians* shows beyond all doubt that the two groups are congeneric and it is merely necessary to decide whether sect. *Aethionematopsis* of *Peltaria* can retain its sectional rank when transferred to *Ricotia*. To this end it will be easiest to summarise the differences which came to light in the point by point comparison of the true *Ricotia* and sect. *Aethionematopsis* and then to take into consideration the characters of the new species, *R. varians*.

It was found that sect. *Aethionematopsis* could be surely and readily distinguished from *Ricotia* in the fruiting condition by its one-seeded (very rarely 2-seeded) fruits and by the presence of a distinct but exceedingly narrow wing outside the marginal vein. In the flowering state separation of the two groups may be satisfactorily effected by consideration of the shorter calyx and petal-claw in section *Aethionematopsis*.

Ricotia varians has its closest affinity with *R. isatoides* (sect. *Aethionematopsis*) in general facies. In size of calyx, however, it agrees rather with the smaller species (e.g. *R. sinuata*) of *Ricotia* proper than with the species of

sect. *Aethionematopsis*. It is, however, the fruit characters which should be decisive in placing the species. It is just here that *R. varians* earns its specific epithet for variability and its characters are also intermediate between the two groups into which the remaining species can be so easily classified. While most of the fruits only mature one seed this may be placed centrally or towards either end, the outline of the fruit varying accordingly. Not infrequently more than one seed is matured, and of the 63 fruits examined 54 contained one seed, 7 two seeds and 2 three seeds. The pod itself has a barely detectable extension outside the thickened marginal vein and this clearly represents the narrow wing of *R. isatoides*. Finally in the characters of the seed itself, those of *R. varians* are distinctly winged while those of *R. isatoides* are scarcely so.

The conclusion drawn from this comparison is that *Ricotia varians* effectively bridges the gap that was previously apparent between *Ricotia* and sect. *Aethionematopsis* and that these two groups may therefore be included under the single genus *Ricotia* without sectional distinction.

The primary division of the genus into annual or perennial species is convenient for purposes of determination and is utilized in the key to the species (p. 128). It does not, however, give the true affinities of the species, nor can this be demonstrated in a linear sequence.

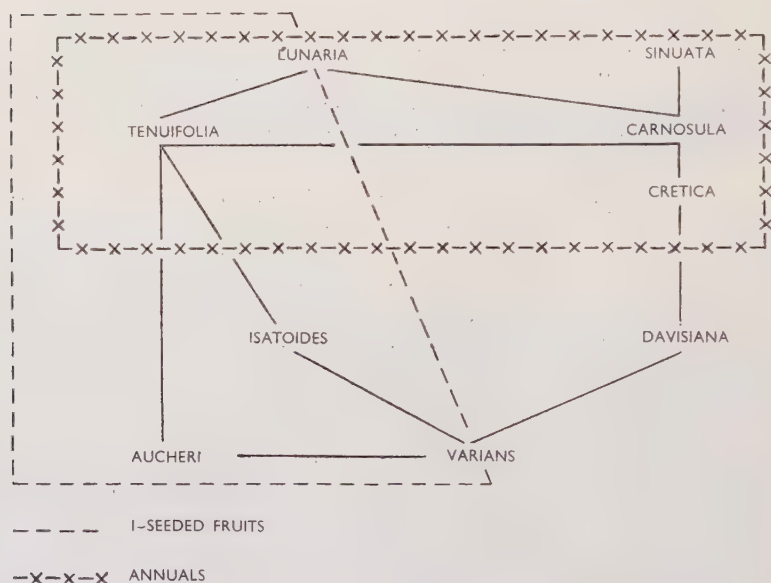


Diagram to illustrate probable inter-relationships of the species of *Ricotia*.

The diagram makes an attempt to show the inter-relationships of the members of this genus. It emphasises that there is a closer affinity between *R. sinuata*, *R. carnosula* and *R. cretica*, which agree in fruit and duration, than between any other group of species. There is no justification for retaining Boissier's division of the genus (Fl. Or. 1: 254-255. 1867) into 2 sections *Siliculosae* (*R. lunaria*, *R. tenuifolia*) and *Siliquosae*

(*R. cretica*, *R. carnosula* and *R. sinuata*) based solely on the proportions of the pod.

No exhaustive investigation of the affinities of *Ricotia* has been attempted, but there seems no reason to doubt that it is correctly placed in the tribe *Lunarieae*, and that *Lunaria* and *Tchihatchewia* are, despite their obvious differences, its nearest allies. Whether it is more closely allied to *Peltaria* and the other genera of the tribe which have small flowers with open calyces, or to *Farsetia* and its allies in *Alysseae* is more debatable; these may have very similar flowers and fruits, but fall into a different tribe on account of their characteristic indumentum of branched hairs. This matter will not be discussed now, but it is desirable to mention one other genus of possible affinity, the Arabian endemic *Horwoodia* described by Dr. W. B. Turrill in 1939 (*Journ. of Bot.* 1939, 116). Vegetatively the annual habit, lobed leaves and large somewhat persistent cotyledons may be noted as characters of *Horwoodia* which are repeated in *Ricotia*. In the flowers themselves there are no important discrepancies, except for the more strongly developed nectaries of *Horwoodia* and features of the gynoeceum which eventually become fully apparent in the fruit. The long calyx of coherent sepals, the lateral ones saccate at the base, and the long-clawed purple petals are common to both genera. In the characters of its fruit *Horwoodia* is, however, utterly different from any genus of *Lunarieae*: thus, though the actual seed cavity shows no compression, the fruit itself is transversely expanded by development of a wing on the lateral ridges; the median (placental) ridges are slightly crested. In the winged fruit of *Tchihatchewia* or *Ricotia* there is definite compression of the seed cavity in the dorsi-ventral plane and the wing is on the median ridges. The fruit of *Horwoodia* is indehiscent and one-seeded and its seed is more or less subcylindric, not strongly compressed as in all the other genera we have been considering. Correlated with this the embryo of *Horwoodia* has longitudinally folded cotyledons, the radicle lying in the groove of the fold: in *Lunarieae* the embryo always has flat cotyledons lying face to face and a laterally placed radicle. In fruit characters *Horwoodia* certainly comes nearest to *Sameraria*, and the purpose of its mention here is simply to emphasise that its floral features show greater affinity with *Ricotia*, *Lunaria* and *Tchihatchewia*; for *Sameraria* and its allies have open calyces and short petals, very different from those of *Horwoodia* though similar to those of *Peltaria* and some other genera of *Lunarieae*. Thus if we accept the placing of *Horwoodia* next to *Sameraria* in the subtribe *Isatidinae* the result is that *Lunarieae* and *Isatidinae* become parallel groups each including both types of floral structure, 'open' and 'closed' calyces. It is not suggested that such a classification is wrong: rather does the inclusion of *Horwoodia* in *Isatidinae* help to justify Schulz's inclusion of *Peltaria* and its close allies in *Lunarieae*; this is one point that has warranted a short digression about *Horwoodia* in consideration of the affinities of *Ricotia*.

Geographically the westernmost species of *Ricotia* is *R. cretica* which is endemic to the island of Crete; in the north east *R. aucheri* is found in Armenia, and in the south east *R. lunaria* grows in Syria and Palestine. Between these outliers we find 5 species in Southern Asia Minor (including the island of Karpathos), and this area may thus be regarded as the headquarters of the genus.

Ricotia L. Sp. Pl. ed. 2, 912 (1763) et Gen. Pl. ed. 6, 337 (1764).

Syn. *Scopolia* Adans. Fam. Pl. 2 : 419 (1763).

Peltaria Jacq. sect. *Aethionematopsis* N. Busch in Kusnezow, Busch & Fomin, Fl. Cauc. Crit. 3 (4) : 178 (1908) ; O. E. Schulz in Engler & Prantl, Natürl. Pflanzenfam. 2 Aufl. 17B : 485 (1936).

TYPUS GENERIS : *Ricotia lunaria* (L.) DC.

CLAVIS SPECIERUM.

Herbae annuae ; folia saltem superiora pinnatipartita.

Fructus ovalis vel ellipticus ; semina 1–5.

Petala intense roseo-purpurea ; fructus ellipticus vel oblongus
2–5-spermus, raro obovatus monospermus, stylo persistente

1. *R. lunaria*.

Petala albida, roseo-venosa ; fructus obovatus monospermus, stylo
caduco 2. *R. tenuifolia*.

Fructus linearis vel lineari-oblongus ; semina 6–12.

Petala minus quam 1 cm. longa ; margo siliquae strangulato-
sinuata 3. *R. sinuata*.

Petala plus quam 1 cm. longa ; margo siliquae plus minusve recta.

Segmenta foliorum superiorum linearia ; fructus 4–5 mm. latus

4. *R. carnosula*.

Segmenta foliorum superiorum plus minusve elliptica vel obovata ;
fructus 8–9 mm. latus 5. *R. cretica*.

Herbae perennes ; folia pinnatipartita, trifoliolata, trifida, crenato-
lobata vel integerrima.

Folia pinnatipartita, trifoliolata, trifida vel crenato-lobata

Planta ubique breviter pubescens ; folia trifoliolata . 6. *R. davisiana*.

Plantae glabrae

Folia trilobata vel pinnatipartita ; fructus vix alatus ; sepala
3·5–4 mm. longa 7. *R. varians*.

Folia crenato-lobata ; fructus ala 0·75 mm. lata circumcinctus ;
sepala 2–2·5 mm. longa 8. *R. isatoides*.

Folia integerrima 9. *R. aucheri*.

1. *R. lunaria* (L.) DC. Syst. Veg. 2 : 284 (1821) ; Boiss. Fl. Or. 1 :
254 (1867) ; Post, Fl. Syria, Pal. & Sinai, 80 (1896) et ed. 2 (ed. Dinsmore)
80 (1932).

Cardamine lunaria L. Sp. Pl. 2 : 656 (1753).

Lunaria foliis supra decompositis, foliolis trifidis, siliquis oblongis pendulis,
Mill. Fig. Pl. 2 : 113, t. 169 (1760).

Ricotia aegyptiaca L. Sp. Pl. ed. 2, 2 : 912 (1763) ; Medicus, Pflanzen-
gattungen, 1 : 45, t. 2, f. 24 (1792) ; Lam. Ill. Gen. t. 561 (1797), 3 :
115 (1823), et Encycl. Meth. 6 : 210 (1804) ; Ait. Hort. Kew. ed. 2, 4 :
98 (1812) ; Bot. Reg. 1 : t. 49 (1815)—*nomen illegitimum*.

Lunaria aegyptiaca Mill. Gard. Dict. ed. 8, no. 3 (1768) ; Desv. Journ. de
Bot. 3 : 174 (1814).

Isatis lunaria (L.) Crantz, Class. Crucif. 104 (1769).

Lunaria ricotia Gaertn. Fruct. & Sem. 2 : 289, t. 142 (1791)—*nomen
illegitimum*.

Ricotia pinnata Moench, Meth. 272 (1794)—*nomen illegitimum*.

SYRIA & LEBANON. “ Syria septentrionalis ”, 1888, *Sinten* 104 (K !).
Sidon [Saida], buissons et rochers sur la rive droite du Nahr Aoulé, fl.

23 Feb., fr. 17 March 1853, *Blanche* 1 (K ! BM !). Between Sidon & Nabatiyeh, 30 March 1877, *Post* 374 (BM !). Sidon, *Gaillardot* (K !). Beirut, 29 March 1933, *Meinertzhagen* s.n. (K ! BM !). Lebanon, April–May 1863, *Osborne* 30 (K !).

PALESTINE & JORDAN. Carmel, 1846, *Boissier* (K !). Haifa, in monte Carmel, solo calcareo, c. 100 m., 15 Apr. 1897, *Bornmüller* 68 (K !). Magdala, 1863–1864, *Lowne* (K ! BM !). Magdala, bushy places, 200 m., 28 Feb. 1911, *Meyers & Dinsmore* 5393 (K !). Gilead, Castle of Subebah, 760 m., 10 May 1911, *Meyers & Dinsmore* G. 1393 (K !).

2. *R. tenuifolia* *Sibth. et Sm.* Fl. Graec. Prodr. 2 : 17 (1813), et Fl. Graeca, 7 : 28, t. 630 (1830) ; *Boiss. Fl. Or.* 1 : 255 (1867).

Peltaria caramaniensis [Sibth. MS. ex DC. Syst. Veg. 2 : 685 (1821), in synon.] *Boiss. Fl. Or. Suppl.* 57 (1888).

ASIA MINOR. Lycia, *Sibthorp* (Oxford ! BM !).

The Lycian Karaman, from which Sibthorp's epithet *caramaniensis* is presumably taken, lies at 37° 0' N. 30° 33' E. slightly inland and to the north west of the port of Antalya. There are other places of the same name in Asia Minor.

3. *R. sinuata* *Boiss. et Heldr.* in *Boiss. Diagn. ser.* 1, 8 : 30 (1840) ; *Boiss. Fl. Or.* 1 : 285 (1867).

ASIA MINOR. Pamphylia : ad rupes promontorii Alaya [Alanya, 36° 22' N., 32° 2' E.], Apr. 1845, *Heldreich* (isotypus, K !) ; in saxosis submontosis prope Alaya, Apr. 1846, *Heldreich* (BM !). Cilicia : sine loco, 1896, *Siehe* 131 (K ! BM !).

This species is recorded by Boissier from Mt. Climax, near Kourmalu, Lycia (that is, on the west side of the Gulf of Antalya), where it was collected by Heldreich ; from Beilan in the Amanus Mountains (coll. Haussknecht) and from Kurdish Cilicia at Schech Meran, a locality I have been unable to place with exactitude ; here it was collected by Kotschy. I have been unable to check any of these specimens, but it should be noted that a plant labelled *R. sinuata* and collected in the northern Amanus at Yarpuz by Siehe (no. 338) proves to be *R. carnosula*.

4. *R. carnosula* *Boiss. et Heldr.* in *Boiss. Diagn. ser.* 1, 8 : 30 (1849) ; *Boiss. Fl. Or.* 1 : 285 (1867) ; Prantl in Engler & Prantl, *Nat. Pflanzenfam.* 3 (2) : 183, fig. 118 c (1891).

R. pestalotiana Cesati in *Bot. Zeit.* 14 : 532, tab. 9 (1856) ; *Boiss. Fl. Or. Suppl.* 47 (1888).

ASIA MINOR. Lycia : Adalia [hodie Antalya, 36° 52' N., 30° 46' E.], Apr. 1845, *Heldreich* (isotypus, K !) ; in lapidosis maritimis prope Adalia, Apr. 1849, *Heldreich* (BM !) ; Adalia, 28 Apr. 1860, *Bourgeau* 17 (K !) ; Antiphellus [hodie Andifilo, 36° 10' N., 29° 42' E.], *Forbes* 89 (K !) ; Konya Alti, near Adalia, 22 March 1936, *Tengwall* 168 (K !) ; Insula Megista [hodie Castelrosso vel Kastelorizo, 36° 7' N., 29° 39' E.], May 1840, *Pestalozza* (typus *R. pestalotiana*—haud visum). Cilicia : bei Yarpuz/Dschebel Bereket [c. 37° 3' N., 36° 20' E.], oberhalb Osmaniye, in Amanus gebirge, 700 m., in Gerölle der Waldberge, Apr. 1912, *Siehe* 338 (BM !)

Boissier suggested that *R. pestalotiana* is conspecific with *R. sinuata*, and

that was the species to which Cesati thought it most closely allied. The published illustration, however, agrees, especially in the compact habit, much more closely with *R. carnosula* which has been collected at Andifilo on the mainland just opposite to Kastelorizo. I therefore regard it as being very probably a synonym of *R. carnosula*.

5. *R. cretica* Boiss. et Heldr. in Boiss. Diagn. ser. 1, 8: 29 (1849); Boiss. Fl. Or. 1: 285 (1867); Raulin in Act. Soc. Linn. Bordeaux, 14: 401, tab. 3 (1869); Rouy, Ill. Pl. Eur. Rar. fasc. 16, t. 379 (1895); Halacsy, Consp. Fl. Graec. 57 (1900); Gandoger, Fl. Cret. 11 (1916); Hayek, Prodr. Fl. Penins. Balcan. (in Fedde, Repert. Beih. 30) 1: 424 (1925); K. H. Rechinger, Fl. Aegaea (in Denkschr. Akad. Wiss. Wien, 105, Halbb. 1) 243 (1943), et Neue Beitr. Fl. Kreta (op. cit. 105, Halbb. 2) 76.

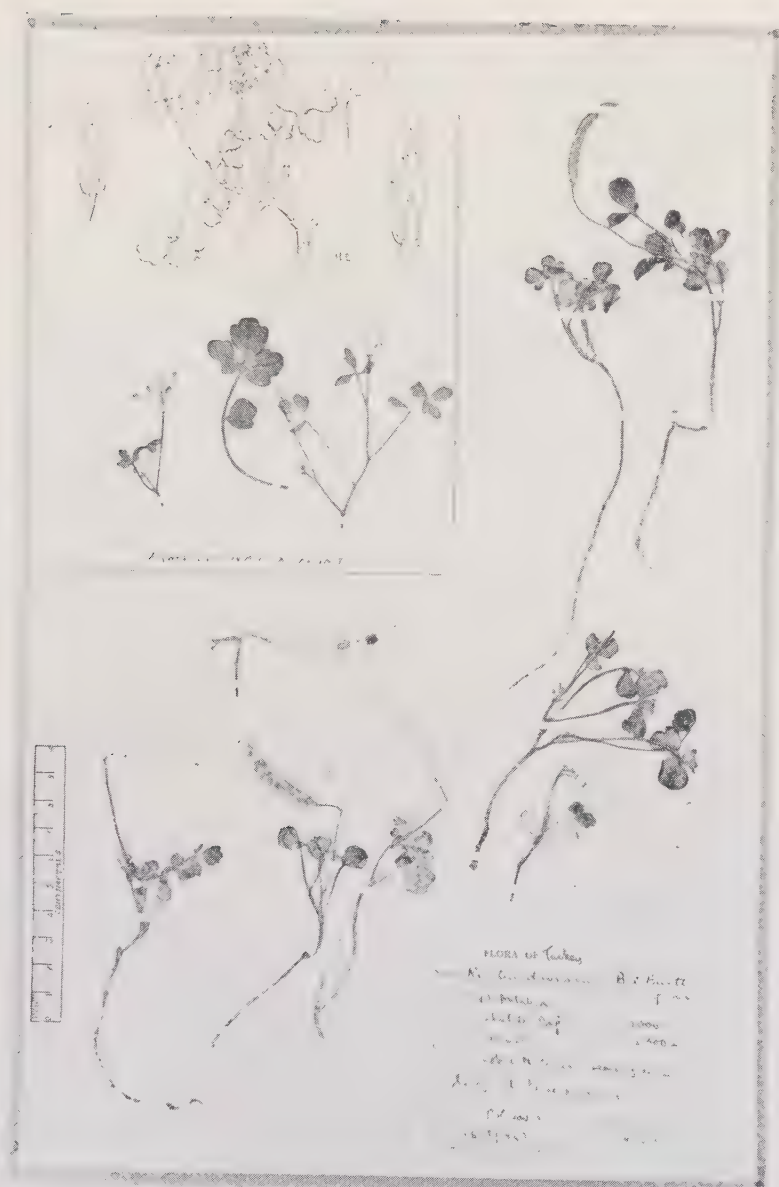
CRETE. In montibus sphacioticis, in regione pinetorum, 1050–1200 m., April 1846, *Heldreich* (isotypus, K!). Sphakia, 14 May 1914, *Gandoger* 5627 (K!). Sphakia, May 1914, *Gandoger* 5808 (K!). Anopolis, distr. Sphakia, 600 m., 20 Apr. 1938, *Davis* 88 (K!). Distr. Sitia, in saxosis calcareis ad promontorium Sidero, 5 May 1942, *K. H. Rechinger* 12616 (K!). Between Trees Eklisea and Koudhoumas (S. Messara), on rocks and scree, 7 March 1940, *Davis* 1240 (K!). Koxaré, distr. Retymo, screes, 150 m., 24 March 1940, *Davis* 1321.

6. *R. davisiana* B. L. Burtt, **sp. nov.** *R. creticae* Boiss. et Heldr. ad formam fructus et seminum maxime affinis, sed habitu perenni et indumento et foliis semper profunde trilobatis valde discrepat.

Herba perennis, 10 cm. usque alta, caulibus pluribus ramosis erecto-flexuosis, radicibus patentibus et (in culta) innovationes emittentibus; *tota* planta pilis brevibus simplicibus recte patentibus vestitis. *Folia* carnosula, omnia longe petiolata, lamina ad basin trilobata; petiolus 3–4 cm. longus; lobi plus minusve aequales (sed laterales basi leviter asymmetrici), obovati, rotundati vel emarginati, integri vel irregulariter et obtuse lobulati, 1–1.5 cm. longi, 8–12 mm. lati; interdum (in planta culta) lobus solitarius e medio petiolo etiam productus est. *Inflorescentia* terminalis, pedunculo nudo circiter 6 cm. longo; flores circiter 6, ebracteati. *Sepala* 4 inter se cohaerentia, exteriores basi leviter saccata, apice abrupte angustata, obtusa, leviter membranaceo-marginata, breviter et patente pubescens. *Petala* 4, ungue 6 mm. longo et 1 mm. lato; lamina pallidissime roseo-purpurea recte patente obcordata, basi levissime auriculata, apice ad 0.75 mm. emarginata, 6.5 mm. longa et 7 mm. lata. *Stamina* 6; 4 longiora filamentis 4 mm. longis basin versus leviter dilatata; breviora filamentis 3 mm. longis basi per 0.5 mm. valde externe curvatis; antherae 2 mm. longae. *Gynoeceium* 2.25 mm. longum, breviter et patenter pilosum, stigmatibus capitato coronatum. *Fructus* pedicello 8 mm. longo suffultus, valde compressus, plus minusve linearis, circiter 5 cm. longus et 6 mm. latus, patenter pubescens, nervo marginali et septo membranaceo praeditus. *Semina* in fructu pleno circiter 12, disciformia, embryo 3 mm. diametro, semina ala hyalina 1.5 mm. lata circumcincta; cotyledones accumbentes 4 mm. longi et 2.5 mm. lati leviter emarginati.

ASIA MINOR. Lycia: Vil. Antalya, Distr. Kemer, Takhtali Dağ; 2000–2300 m.; mobile north-facing screes; leaves glaucous fleshy,

PLATE 1.



Ricotia davisiana B. L. Burtt

PLATE 2.



Ricotia varians B. L. Burtt

flowers lilac-pink ; 16 Aug. 1947, *Davis* 14123 (typus, K !); *ibid.*, north scree and north ridge, 10 July 1949, *Davis* 15096 (K !).

7. *R. varians* B. L. Burt, sp. nov. ex affinitate *R. isatoidei* (Barbey) B. L. Burt a qua floribus majoribus, fructibus interdum 2-3-spermis (saepissime monospermis), semina latius alata distinguitur. *R. davisianae* B. L. Burt etiam affinis sed glabritie et fructibus saepissime monospermis nunquam 8-12-spermis facile distinguitur.

Herba perennis, 10 cm. usque alta, caulibus pluribus ramosis erecto-flexuosis ; tota planta glabra. *Folia* subcarnosula, petiolata, lamina trifida vel pinnatim 4-5-fida in petiolum cuneatim attenuata ; petiolus longitudine varians, 1-5 cm. longus ; segmentum laminae medium aliis majus, anguste ellipticum ad obovatum, usque 2 cm. longum et 1 cm. latum sed plerumque minus, apice rotundatum (interdum mucronulatum) vel subacutum, plerumque integrum ; segmenta lateralia superiora sed plerumque minora et leviter obliqua ; segmenta lateralia inferiora (si adsint) multo minora. *Inflorescentia* terminalis ebracteata racemosa, pedunculo nudo 6-12 cm. longo 6-15-floro. *Pedicellus* anthesin 2.5 mm., sub fructu 4 mm. longus. *Sepala* 4, inter se cohaerentia, exteriores leviter saccata, 3.5 mm. longa, 1.5 mm. lata, elliptica, apice ad margines paullo hyalina. *Petala* roseo-lilacina, 7 mm. longa, ungue 3.5 mm. longo, lamina obcordata 3.5 mm. longa et 4 mm. lata horizontaliter patente. *Stamina* longa filamentis 2 mm. longis ; brevia filamentis 1 mm. longa ; antherae 1.5 mm. longae. *Gynoeceum* 1 mm. vix excedens, 0.25 mm. latum leviter compressum, stigmatibus sessilibus. *Fructus* plerumque monospermus, raro 2-3-spermus, elliptica vel obovato-elliptica (immaturus) circiter 1.5 mm. longus et 8 mm. latus. *Semina* immatura disciformia, membranaceo-alata, 5 mm. diametro.

ASIA MINOR. Pisidia/Isauria. Prov. Isparta, distr. Sutçüler ; Dedegöl Dag above Oruz Gaz Yayla ; mobile south-facing scree ; perennial with lilac-pink flowers ; 2200-2400 m. ; 2 Aug. 1949, *Davis* 15958 (typus, K !). *Ibidem*, above the tarn Dedegöl ; mobile scree ; 2500 m. ; 3 Aug. 1949, *Davis* 16000 (K !).

8. *R. isatoides* (Barbey) B. L. Burt, comb. nov.

Peltaria isatoides Barbey in Bull. Soc. Vaud. Sc. Nat. 21 : 219 (1885) et apud Stefani, Major & Barbey, Karpathos, 94, tab. 1 (1895) ; Boiss. Fl. Or. Suppl. 56 (1888) ; Hayek, Prodr. Fl. Penins. Balcan. (in Fedde, Repert. Beih. 30) 1 : 480 (1925) ; O. E. Schulz in Engler & Prantl, Natürl. Pflanzenfam. 2 Aufl. 17B : 485, fig. 295 E, F (1936) ; K. H. Rechinger, Fl. Aegaea (in Denkschr. Akad. Wiss. Wien, 105 Halbb. 1) 243 (1943).

KARPATOS [hodie SCARPANTO]. Ad pedes montis Messi, 12 May 1883, *Pichler* 50 (isotypus, K !). M. Lastos, in glareosis calcareis montis Kollas, 600 m., 18 June 1935, *K. H. & F. Rechinger* 8284 (K !).

9. *R. aucheri* (Boiss.) B. L. Burt, comb. nov.

Peltaria aucheri Boiss. in Ann. Sc. Nat. ser. 2, 17 : 175 (1842) et Fl. Or. 1 : 301 (1867) ; N. Busch in Kusnezow, Busch & Fomin, Fl. Cauc. Crit. 3 (4) : 179 (1908), et in Komarov, Fl. U.R.S.S. 8 : 596 (1929) ; Bornmüller, Symb. Fl. Anatol. in Fedde, Repert. Beih. : 89 (2), 65 (1936).

ASIA MINOR : ARMENIA. Sine loco, *Aucher-Floy* 285 (isotypus, K ! BM !). Egin [hodie Kemaliye, 39° 20' N., 38° 30' E.], in declivibus saxosis ad Euphratem, 13 May 1890, *Sintenis* 2281 (K !); ibidem, 18 June 1890, *Sintenis* s.n. (BM !). Kasnardagh, inter Egin et Arabkir, 24 June 1889, *Sintenis* 915 (K !). Circa Tortum [41° 30' N., 41° 20' E.], in glareosis, June 1853, *Huet du Pavillon* (K ! BM !). In districtu Artwin [39° 12' N., 41° 45' E.], 12 Apr. 1908, *Woronow* s.n. (BM ! "*P. aucheri*" det. N. Busch); ibidem, 17 June 1907, *Woronow* 518 (typus *P. woronowii*, haud visum).

Busch remarked that his *Peltaria woronowii* differed from *P. aucheri* by its much broader leaves, large petals and round, not obovate, pods. But I find that the Kew herbarium sheet of *Aucher* 285 (the type number of *P. aucheri* Boiss) has one shoot with very broad leaves and one with almost orbicular young pods. It is scarcely conceivable that *Aucher* collected both species mixed together and I have little doubt that, when the species is better known, it will be found that *Woronow's* plant lies within the normal range of variation of *Ricotia aucheri*.

SPECIES EXCLUDENDAE.

R. CANTONIENSIS *Loureiro*, Fl. Coch. 397 (1790), ed. Willd. 482 (1793) = *Rorippa cantoniensis* (Lour.) Ohwi in Acta Phytotax. et Geobot. Kyoto, 6 : 55 (1937). [Syn. *Nasturtium microspermum* DC.; *Rorippa microsperma* (DC.) L. H. Bailey].

R. MULTIFIDA *Herb. Banks* ex DC. Syst. Veg. 2 : 685 (1821), in synon. = *Heliophila diffusa* (Thunb.) DC.

R. TENERA *Herb. Banks.* ex DC. Syst. Veg. 2 : 685 (1821), in synon. = *Heliophila peltaria* DC.

PARARISTOLOCHIA GOLDIEANA (HOOK f.) HUTCH. ET DALZ.

This member of the *Aristolochiaceae* is described and illustrated by Hutchinson and Dalziel in their Flora of West Tropical Africa. Mention is also made of it by J. D. Kennedy in his Forest Flora of Southern Nigeria. He gives the native name in the Bini language, Ugbogiorimi, and has noted that the word "orimi" means a corpse, but, as far as I can trace, there is no published record of the full translation of the local name. It is a compound word derived from Ugbo=a grove or field; Ogie=a king; and Orimi=a corpse or the dead. Thus the name becomes "The Grove of the King of the Dead". It is not known with certainty how the name arose, some maintain that it was simply on account of the smell of decaying flesh that emanates from the mature flower. The more popular version is that the opened bowl of the perianth is one of the favourite haunts of a small venomous snake that uses the foul smelling flower as a lure for its prey.

In the Ibo language the name is Ekommili :—Eko=bellows; Mmili=water, or anything soft and weak, or fragile. Hence, "A Fragile Bellows". The immature flower before the top of the perianth splits open is similar in appearance to the primitive bellows used by native blacksmiths to blow up their forge fires.

A. H. GREEN.

MARINE ALGAE FROM THE GOLD COAST : II.

C. I. DICKINSON and V. J. FOOTE.

ULVACEAE

Ulva lactuca L. Spec. Pl. 1163 (1753).

Winneba Feb. '49. Prampram towards Ningo Jan. '46.

In rock pools near high tide.

Ulva rigida Ag. Spec. Alg. 410 : (1822).

Prampram Sept. '43.

On rocks in all zones except the outer part of the Outer Zone. These plants are a fuscous green and have the characteristic thick walled cells which are elongate in transverse section.

Ulva fasciata Delile Flore d'Egypte 153 (1812).

Tantum Dec. '48. Prampram Nov. '49, Sept. '43. Labadi May '40. Winneba Dec. '49.

To judge from a collection of about 50 sheets this is the common species on this coast but it should be pointed out that while there is a good deal of material that can be regarded as typical *fasciata*, there are many specimens which appear to be broad forms of *fasciata* but have the structure of *lactuca*. This applies particularly to the collection from Tantum.

VALONIACEAE

Ernodesmis verticillata (Kütz.) Boergs. in Bot. Tidsskr. **32**, 259 (1912).

Prampram Jan. '43.

On rocks near *Struvea* in the Middle Zone.

CAULERPACEAE

Caulerpa vickersiae Boergs. in Bot. Tidsskr. **31**, 129 (1911).

Prampram Jan. '49.

Growing with *Bryopsis* on the edge of Middle Zone rocks. This very small *Caulerpa* of the Atlantic has recently been a bone of contention between those who identified it with Okamura's *C. dubia* from the Bonin Islands and those who considered it distinct. The Gold Coast material is uniformly distichous, without constrictions and with numerous bipartite ramuli and it in no way departs from the descriptions of Vickers and Boergesen. The Kew specimens no. 95 of Okamura's *Algae Japonicae Exsiccatae* are multiseriate and irregularly branched. While there is now some reason for believing that the West Indian plant and the Japanese one belong to the same species it seems best to retain the name *C. vickersiae* on the grounds that the Gold Coast plants are clearly identifiable with Boergesen's West Indian material and with the illustrations of Vickers for Barbadoes and Taylor for Florida whereas until there is more information about the Asiatic plant one cannot with conviction identify them either with Okamura's description or his *Exsiccata*.

Caulerpa sertularioides (Gmel.) Howe in Bull. Torr. Bot. Cl. **32**, 576 (1905).

Axim Apr. '49, Jan. '49.

Growing on a natural causeway between the lighthouse and the mainland and uncovered at very low tides ; also on the side of a deep rock pool below the seaward face of the lighthouse.

Caulerpa racemosa (Forssk.) Web. v. Bosse var. **occidentalis** (J. Ag.) Boergs. in K. Dansk. Vidensk. Selsk. Skr. **7**, Rk. Naturvid. og Math. Avd. **4**, 379 (1907).

Sekondi Dec. '49.

Growing on the sides of large rocks at low tide level. The varieties of this very polymorphic species are notoriously difficult to separate. Our specimens approximate to var. *occidentalis* although the branching is rather lax like that of var. *clavifera*. They possibly resemble some Philippine plants described by Gilbert as var. *clavifera* which he says have certain characters belonging to *occidentalis*.

DICTYOTACEAE

Padina tetraströmatica Hauck in Hedw. **26**, 43 (1887).

Prampram March '49, Nov. '49.

In the Middle Zone downwards together with *Dictyota* recolonising rocks from which the tops had been removed.

The difficulties in the way of making satisfactory determinations in the genus *Padina* are numerous indeed and while awaiting Dr. F. Thivy's much needed monograph it seems best in assigning tentative names to give some description of the material in hand.

The only named specimens of *P. tetraströmatica* in the Kew Herbarium are those of Boergesen from the Arabian Sea and Ceylon and from these the Gold Coast plants differ most conspicuously in colour, our specimens being brownish whereas the Indian Ocean specimens are described by Boergesen as olive green. Boergesen however expressed some doubts about his material as it did not altogether tally with Hauck's description. Our plants on the other hand more nearly approximate to the type in structure, the greater part of the frond being 4 cells thick. The sori occur in concentric lines on either side of and close to each row of hairs so that the fertile zone of two rows of reproductive bodies enclosing a row of hairs is about $\frac{1}{2}$ mm. broad and the sterile areas between are 2 to 2.75 mm. broad. No indusium has been observed. These two closely approximating rows of reproductive bodies are found on what is generally referred to as the upper surface that is to say the surface away from which the edge is rolled, but whether this actually is the dorsal or the ventral surface it is impossible to say from herbarium material. In the older parts of the thallus a few scattered sori may occur on the reverse side and about half way between the rows of hairs. The reproductive bodies are assumed by analogy to be tetrasporangia although the formation of tetraspores has not been seen. All specimens in this series are free from surface lime.

Padina durvillaei Bory in L. J. Duperrey, Voyage autour du monde etc. pl. 21, fig. 1 (1826).

Prampram Jan. '49, March '49, Sept. '43, Nov. '49.

Winneba Feb. '49. Elmina Apr. '45.

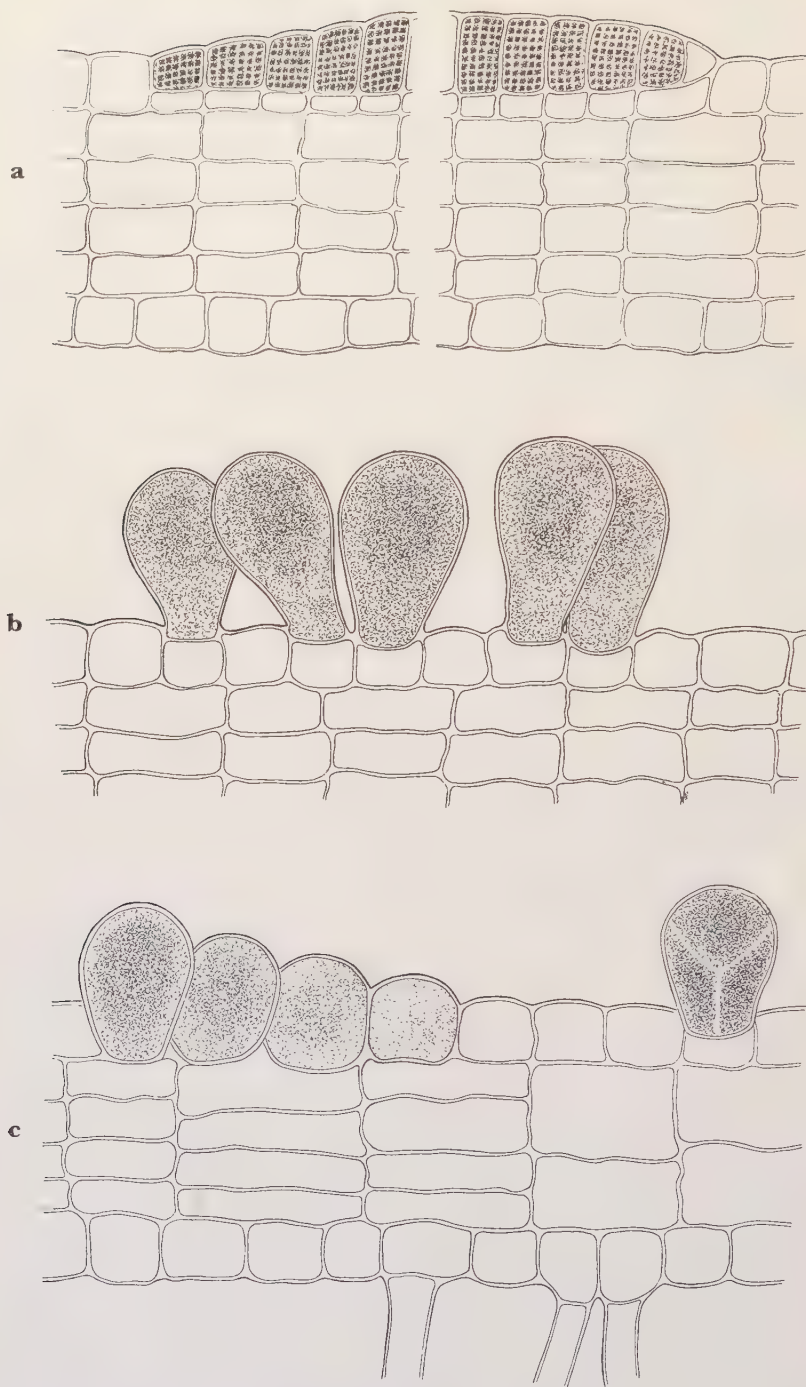
Common on Middle Zone rocks and on sand covered rocks in pools. After a good deal of deliberation a rather varied assemblage of specimens has been placed here. They were at first thought to be female plants of *P. vickersiae* which appears to be the common Atlantic species, but from such scattered information as there is in the literature, from illustrations and a small amount of material in the Kew herbarium, the evidence is in favour of classifying these plants as *P. durvillaei*. Taylor makes the following statement about *P. durvillaei* "Some specimens of *P. durvillaei* are firm, indeed almost leathery while at the other extreme some are quite as delicate as West Indian *P. vickersiae* of the same size". The January, February, March and November plants are slightly or very slightly calcified, while the April and September plants are uncalcified. All are a dark olivaceous colour, six cells thick in the upper part of the thallus, and thick and stupose at the base. The reproductive bodies which judge by their elongate shape and closely packed formation are oogonia are found generally in two concentric rows in each interpilar zone. These bands are about 1 mm. wide, the lower are about 1 mm. from the row of hairs, the upper are slightly closer to the neighbouring rows of hairs. No male organs have been found but this is not altogether inexplicable because the species is probably dioecious and if the male plants were much smaller than the female as for instance are those described by Boergesen for *P. vickersiae* they might well be overlooked by the collector. All the gatherings contain some plants with reproductive bodies but most of those collected in February and March are sterile so that possibly this is a period of low fertility.

***Padina mexicana* Dawson.** The Marine Algae of the Gulf of California; Allan Hancock Pacific Expedition 3, 231 (1944).

Takoradi Dec. '49 ♀ ♂. Apr. '50 ⊕.

Under this name are included two gatherings in formalin sea water in one of which collected in December there are some mature male and female plants and in the other collected in April a few tetrasporangial plants. We have in addition three sheets of dried material from the December gathering which show considerable calcification of the upper surface and amongst which there are oogonia bearing plants. There is no certainty that these two are connected but it seems reasonable to suppose since they show great similarity and are from the same locality that they are two generations of the one species. The difference between these plants and those from the Gulf of California as recently described by Dawson seem to be too slight to justify separation, so they are placed here until authentic specimens of *P. mexicana* are available for examination. Dawson describes only tetrasporangial plants and says "Antheridia and oogonia unknown". Whatever these plants may be it appears that the gametophytes have not yet been described.

Sexual plants. These are small, generally not exceeding 4 cms. from the base to the rolled edge, broadly flabellate and imbricate. The plants are attached by an abundance of rhizoids growing from the under surface and arising along rather vague concentric lines. They envelop and become firmly attached to small irregularities of the substratum. Except on the appearance of gametangia male and female plants look alike. In



Padina mexicana Dawson.

- (a) Transverse section of a male thallus showing about half the length of an antheridial sorus $\times 270$. (b) Transverse section of a female thallus showing oogonia $\times 270$. (c) Transverse section of an asexual thallus showing tetrasporangia and rhizoids $\times 270$.

the material so far available both kinds of gametangia occur as two broad bands in each interpilar zone, always on the upper surface. The distance between two rows of hairs is 3 to 3.5 mm. The antheridia occur as two uniformly broad bands 1 mm. or more in width ; the oogonial bands are more irregular. The edge of the thallus is rolled upwards on to the dorsal surface. The thallus is usually 6 to 7 cells thick in the reproductive regions and in this respect it differs from Dawson's tetrasporangial plants which are described as 4 to 6 cell layers in the older parts.

Asexual plants. The difference between these and the sexual plants is mainly one of size, the tetrasporangial plants as a rule not exceeding 2 cm. from base to edge. Only a few specimens are fruiting but in those observed the sporangia are in rather indefinite rows or scattered in each interpilar zone. It is often difficult to decide if certain reproductive bodies are tetrasporangia but in this case some of the sporangia show quite clearly the formation of tetrads of spores. The thickness of the thallus in the sporogenous area is generally 6 cells but occasionally 4.

Dictyopteris delicatula *Lamour.* in Journ. Philom. no. 20, tab. 6, (1809).

Tantum Dec. '48. Prampram Jan. '49, Nov. '49.

From wave swept rocks at low tide.

Pocockiella variegata (*Lamour.*) *Papenfuss* in Amer. Journ. Bot. 30, 467 (1943).

Prampram Jan. '43.

Washed up with other seaweeds and sponges between Prampram and Great Ningo.

ENCOELIACEAE

Colpomenia sinuosa (*Roth*) *Derb. et Sol.* in Compt. Rend. Acad. Sci., Suppl. I, 11 (1856).

Tenpobo May '50. Prampram Jan. '45, Jan. '49, Aug. '45, Nov. '48.

CHAETANGIACEAE

Galaxaura oblongata (*Ellis et Sol.*) *Lamour.* Hist. Polyp. 262 (1816).

Prampram Jan. '43, Jan. '46, Nov. '39.

Rare on Middle Zone rocks.

GRATELOUPIACEAE

Grateloupia filicina (*Wulf.*) *Ag.* Spec. Alg. 223 (1822).

Prampram Nov. '48, Jan. '46.

From Middle Zone rocks.

CERAMIACEAE

Wrangelia argus (*Mont.*) *Mont.* Syll. Gen. Spec. Crypt. 444 (1856).

Sekondi Dec. '49 ⊕.

Growing at the extreme edge of the seaward side of a rock ledge.

RHODOMELACEAE

Digenea simplex (Wulf.) Ag. Spec. Alg. 389 (1822).

No locality Oct. '49.

Of this very common alga of warm seas there is only one small specimen in formalin. No locality is given and further information is not at present available.

Pterosiphonia pennata (Roth) Falkenb. Rhodomelaceen 263 (1901).

Anamabu Dec. '45. Prampram Sept. '43, Aug. '39, Jan. '49.

On rocks from Middle Zone to low tide level.

PUCCINIOSIRA MITRAGYNES AND P. ANTHOCLEISTAE.

F. C. DEIGHTON.

In 1895 (Ber. Deutsch. Bot. Ges. **13**, p. 334), Dietel described *Schizospora mitragynes*, the type species of his new genus *Schizospora*, from material in Herb. Kew. collected in Sierra Leone on leaves then identified as *Mitragyne macrophylla*. This collection, of which there is ample material in Herb. Kew., was made by G. F. Scott-Elliot, no. 4752, near Wallia [Koinamaka Chiefdom], Sierra Leone, February [1892]. The fungus is figured in Ber. Deutsch. Bot. Ges. **13**, 1895, tab. xxvi, fig. 15, and in Engler-Prantl, Natuerl. Pflanzenfam. I Teil, Abt. 1**, p. 37, fig. 22A.

In 1900 (Engler-Prantl, Natuerl. Pflanzenfam. I Teil, Abt. **, p. 549), Dietel merged his genus *Schizospora* into *Puccinosira* Lagerh. (Ber. Deutsch. Bot. Ges. IX, 1892, p. 344) and stated that *Schizospora mitragynes* was the only representative of this genus so far known in Africa. He did not, however, actually publish his new combination *Puccinosira mitragynes*: this combination was first published in P. & H. Sydow, Monogr. Uredin., 1915, vol. iii, p. 541.

Schizospora anthocleistae P. Henn. was described in 1904 (Engl. Bot. Jahrb. xxxiv, p. 41) on leaves of *Anthocleista orientalis* Gilg. from Amani, German East Africa (Zimmermann n. 20—Aug. 1902). Hennings states that *P. anthocleistae* is very close to *Schizospora mitragynes* and perhaps the two should be regarded as one species, though the host plants belong to two different families, Rubiaceae and Loganiaceae: this is repeated by P. & H. Sydow in Monogr. Uredin., 1915, vol. iii, p. 541, in which *P. anthocleistae* is figured as tab. xxv, fig. 174. *S. anthocleistae* was transferred by Hennings in 1905 (Engl. Bot. Jahrb. xxxviii, p. 104) to *Puccinosira* as *P. anthocleistae* P. Henn.

Mr. E. Milne-Redhead has kindly examined the type specimen (Scott Elliot no. 4752) of *Schizospora mitragynes* Diet. in Herb. Kew., and says that the leaf of the host plant is not *Mitragyna* but is an *Anthocleista*, either *A. nobilis* G. Don or *A. vogelii* Planch. There is thus no valid reason for separating *Puccinosira mitragynes* (Diet.) Diet. ex P. & H. Syd. from *P. anthocleistae* (P. Henn.) P. Henn. and, although a misleading name, *Puccinosira mitragynes* has priority.

The fungus is common (represented by 9 collections) in Sierra Leone on *Anthocleista frezoulsii* A. Chev., *A. nobilis* G. Don and *A. vogelii* Planch., but I have not yet seen a rust fungus on *Mitragyna* there.

I am grateful to Dr. G. R. Bisby for drawing my attention to this matter.

THREE NEW ACACIAS FROM THE OGADEN

H. B. GILLILAND

Botanical Department, Witwatersrand University, South Africa

In November 1944, during the course of a reconnaissance into the Ogaden with Major P. E. Glover on pasture survey for the Military Administration of British Somaliland, a camp was established in the area of the wells of Walwal and Wardere and the bulleh at Sirrauw. A joint collection of some 200 numbers from this areas was made. A special interest in the genus *Acacia* by the present writer led him to photograph several unusual looking plants as well as to collect specimens, and opportunity of investigating further during a period of leave in London has occurred. It appears that three of these plants are new to science and they are described below.

Acacia impervia Gilliland, sp. nov.—Inter species floribus spicatis *A. nigrescentem* Oliv. manifeste revocat, sed legumine submembranaceo latiore saepe torto 6×3 cm. differt.

Frutex ad 2 m. altus, erectus, ramosus, ramis adscendentibus. Cortex ramorum juniorum purpureus, lenticulis obscuris. Aculei 3, rubidi, nigrescentes, glabrati, 2 loco stipularum erectis, 1 sub petiolo recurvo. Folia bipinnata, 2-juga, pinnis 1-jugis; rhachis ad 3 cm. longa, 2–3 aculeis minutis abaxialibus armata et ad basin glandulam adaxialem gerens; rhachilla 1 cm. longa, basi pulvinata, aculeo minuto armata; foliola inaequilateralia, obovata, apice rotundata vel emarginata. Flores spicati. Legumen planum, submembranaceum, recens saepe tortum et splendide purpureum, ad 6×3 cm.; semina 2–3. Plate 3.

Glover & Gilliland no. 386 (typus in Herb. Kew.) “Not uncommon shrub usually with a short trunk 1–2 ft. and branching to form a flattish or rounded top. Fruits often highly coloured, purplish. Between Wardere & Walwal, Ogaden. 22/11/1944. *Waraba gega ice*”.

This *Acacia* much resembles *Aacacia nigrescens* Oliv. from which however it is easily distinguished by its flat broad usually rather twisted pod. The Somali name “*Waraba gega ice*” was explained as meaning that “even the hyaena cannot penetrate this bush, it is so prickly”.

Acacia gloveri Gilliland, sp. nov.—Inter species floribus capitatis *A. socotranæ* Balf. f. similis sed ramis erectis, legumine nitido flavo-viridi minute et sparsim piloso, cortice juniore spinisque glabris, facile distinguenda.

Frutex ad 2 m. altus, erectus, ramosus, ramis ascendentibus. Cortex ramorum juniorum purpureo-brunneis, lenticulus notatus. Spini 2, glabrescentes, graciles, recti, 3–4 cm. longi, primum purpureo-brunnei, demum argenteo-pallidi. Folia plerumque fasciculati, bipinnati, 5–7-juga, pinnis 8–13-jugis; rhachis 5.5–7.5 cm. longa, minute pilosa in appendicem acutam hirsutam terminans; foliola (inferiores minores) oblonga approximata 5.5×1.5 mm., supra fusco-viridia, subtus pallida. Flores capitati pedunculo brunneo piloso 1.5 cm. longo basi bracteato in fructu incrassato. Legumen falcatum, teres, nitidum, flavo-viride in sicco fulvum, valvis intus alveolato-septatis carnosissimis; semina 6–8, ovoidea, nigra. Plate 4.

Glover & Gilliland no. 388 (typus in Herb. Kew.) "Flat-topped small shrub noticeably dark green, with long light yellow-greenish slightly curved thick pods. Sometimes larger and obpyramidal. Between Wardere & Walwal, Ogaden. 22/11/1944. *Cheeak*".

Although the resemblance of the *Cheeak*, especially the smaller ones, to the *Jerin* (*A. socotrana* Balf. f.) is marked, the darker colour of the whole plant, its general lack of hairiness and its shining yellowish pod are unmistakable. Furthermore *A. socotrana* occurs in the same area (G. & G. no. 338).

Acacia walwalensis *Gilliland* sp. nov.—Frutex ad 2 m. altus, ramosus. Cortex ramorum juniorum purpureo-brunneus, lenticulis manifestae notatus. Spini 2, robusti, 1.5–2 cm. apice recurvati, purpureo-brunnei. Folia plerumque fasciculata, bipinnata, 3-juga, pinnis terminalibus grandius foliolata (foliolis terminalibus maximus 1.5/1 cm.) 3–4-juga, inferioribus 2–1-juga; rhachis 3.5–4.5 cm. longa, in appendicem subfoliosam acutam terminans; rhachillis similiter appendiculatis; foliola subopposita, inaequilatera, elliptica vel rhomboidea, apice acuta vel rotundata, minute apiculata, glabra, supra fusco-viridia, subtus pallida nervis prominentibus. Flores capitati, albi, pedunculo gracili minute pubescente 3.5–4 cm. longo media bractea 2 cordatas acuminatas pubescentes gerenti in fructu robusto. Legumen rectum vel falcatum, maturitate purpureo-brunneum, torulosum, intus alveolato-septatum; semina 8–10, ovoidea, nigra. Plate 5.

Glover & Gilliland no. 392 (typus in Herb. Kew.) "Shrub, usually obpyramidal, up to 8 ft. Flowers white in globose heads, pods constricted between seeds. Locally fairly frequent between Wardere and Walwal, Ogaden. 21/11/1944. *Dilibeh*".

Unique among the African capitate Acacias in its torulose pod, whilst the structure of the leaves with both the terminal pinnae and leaflets the largest is matched only in some forms of *A. mellifera* (Vahl) Benth. which has spicate flowers.

Embryology*—Many years have now elapsed since Coulter and Chamberlain's "Morphology of Angiosperms" was published in 1903. Since then no other book dealing with the events that precede the initiation of the embryo and with its subsequent development has appeared in the English language. It is true that Dr. Karl Schnarf's monumental "Embryologie der Angiospermen" was published in 1929, but probably only a few English speaking students have had the time and inclination to digest the contents of Schnarf's important work of reference. In order to fill the gap in the literature which has thus arisen, P. Maheshwari, who is Professor of Botany at the University of Delhi, and whose numerous papers on angiosperm embryology and associated phenomena are already well known to a wide audience, was prevailed upon by his botanical friends to write a book summarizing the present information concerning these topics. There can be no doubt that the book will serve a most useful purpose in bringing together a mass of information which has hitherto been widely scattered in sundry journals. It is, moreover, to be hoped that it will provide a text for introducing

PLATE 3.



Acacia impervia Gilliland

[To face page 140

advanced students in Universities to a subject concerning which they usually have but little instruction, at least in Great Britain.

The term "embryology" is, strictly speaking, applicable only to the processes whereby a fertilized egg develops into a mature embryo such as occurs in a ripe seed. Some of those who consult this book may, therefore, be surprised to find how small a proportion of the text is concerned with the subject as understood in this restricted sense. It is, indeed, not until we come to chapter 8 on p. 268 that embryology in the strict sense is discussed, and then it is dealt with in some 44 pages. This is because the author follows those botanists who apply the term "embryology" to all the changes that lead up to the formation of the gametes, to the process of fertilization, and to the subsequent behaviour of the contents of the embryo sac. In this respect Maheshwari's book resembles the earlier one by Schnarf.

The text is divided into 13 chapters with a selected bibliography at the end of each. Chapter 1 gives a brief history of the subject, in which it is interesting to be reminded that pollen tubes were first observed by Amici as recently as 1824, and it was not until 1884 (8 years after the opening of the Jodrell Laboratory) that syngamy was discovered by Strasburger, whilst triple nuclear fusion was observed still later in 1898, and parthenogenesis at about the same date. Succeeding chapters then deal in turn with the microsporangium, the megasporangium, the embryo, apomyxis, and polyembryony. Amongst many other interesting facts we are told in these chapters that 8-nucleate pollen grains, resembling embryo sacs, have been observed in *Hyacinthus*; that vascular tissue occurs more widely in nucellar and integumentary tissue than was at one time supposed; that male gametes are always cells, the cytoplasmic sheaths persisting throughout their course in the pollen tubes; that fertilization has been observed in detail in only a few species. In chapter 4 it is shown that embryo sacs fall into some 10 different types, and may be monosporic, bisporic or tetrasporic in origin. The type about which one usually learns in an elementary botany course occurs in about 70 per cent. of the angiosperms that have been investigated. In spite of the various methods of development displayed by embryo sacs, their eventual organization shows a surprisingly uniform pattern, radical differences from the basic type having been observed only in *Peperomia*, *Plumbago*, *Plumbagella* and *Acalypha indica*. Following the French botanist Souèges, the author classifies embryos in 5 principal types. These are based on the sequence of cell divisions by which the 4-celled proembryo is formed, and the contribution made by each of these cells to the body regions of the mature embryo. Unfortunately each of these types has been named after a family in which it is exemplified. Thus, for example, there are embryos of the "Solanad", "Caryophyllad" and "Chenopodiad" types. To the reviewer it seems that it would be advantageous to devise descriptive terms for these types since it does not necessarily follow that each is to be found only in members of the family after which it is named. The same principle applies in the nomenclature of embryo sac types. Thus the "Polygonum" or normal type occurs in a wide range of families.

There is an interesting chapter dealing with the relationship between

embryology and taxonomy. Here the author avers that "almost every structure has been shown to yield results of (taxonomic) importance". To mention only a few of the examples he gives of "embryological" characters that possess taxonomic value one may cite the question of whether the anther tapetum is glandular or amoeboid; the morphology of pollen grains; the number of integuments and the changes they undergo whilst the seed is being formed; the type of endosperm; the occurrence of parthenogenesis. By making use of these characters the author draws such taxonomic conclusions as that the Empetraceae should be included in the Ericales; that the Cactaceae are allied to the Centrospermae, forming a "sort of bridge" between the Aizoaceae and Portulacaceae; that *Trapa* should be excluded from the Onagraceae, since all members of this family, apart from this one genus, have 4-nucleate embryo sacs. The author rightly emphasizes that the embryologist's views on taxonomy are of a tentative nature and must be expressed with due caution. This cautious approach seems to the reviewer to be highly desirable for the reasons that the embryology of only a relatively small proportion of the angiosperms is at present known, whilst great skill is necessary if good quality microscopical preparations are to be made and accurately interpreted.

The 2 concluding chapters are headed "Experimental Embryology" and "Theoretical Conclusions" respectively. The first of these is concerned with such diverse topics as the storage of pollen; ensuring that fertilization will take place by shortening the length of the style; the cultivation of iris embryos in agar culture; the artificial induction of parthenogenesis. Under "Theoretical Conclusions" the author compares the embryo sac of the angiosperms with that of the gymnosperms, but reaches no firm conclusion concerning the homologues of the 8-nucleate embryo sac. The 8-nucleate embryo sac is, however, regarded as a primitive type amongst the angiosperms from which the other types have been evolved. In discussing how the process of fertilization within a closed carpel may have been evolved in angiosperms, the author attaches significance to the occasional occurrence of pollen grains in the stylar canal of *Butomopsis*, and to the still rarer occurrence of intracarpellary grains in a few other genera. Finally the author states his belief that the facts of embryology indicate that the angiosperms are monophyletic, a conclusion, concerning which all will not agree, based on the similarity in the organization of the male and female gametophytes in the Monocotyledons and Dicotyledons.

The book which, apart from some distorted printing on the lower part of p. 346 and a misprint in the 2nd line on p. 412, is well produced, concludes with an index to authors and another to subjects and plant names. The numerous very clear illustrations are mostly based on those published by a wide range of authors, including some by Maheshwari's own students. The author has provided a very lucid and concise account of the numerous topics discussed, and the book will doubtless be welcomed both by students and research workers.

C. R. METCALFE.

*Angiosperm Embryology.—An Introduction to the Embryology of Angiosperms. By P. Maheshwari. McGraw Hill Book Co. Inc. 1950. Pp. x, 453. \$6.00.